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An analysis of current inventory control and practices to provide recommendations on how to transfer interim supply support from NAVSEA to NAVSUP and then manage that material

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MBA PROFESSIONAL REPORT

An Analysis of Current Inventory Control and Practices to Provide Recommendations on How to Transfer Interim Supply Support From NAVSEA to NAVSUP and Then Manage That Material

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June 2011

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This project is designed to provide a policy recommendation for transitioning custody of NAVSEA's Interim Supply Support to NAVSUP based on the analysis of current business practices at NAVSEA, NAVICP-P and NAVAIR. NAVSEA has identified that it has OM&S valued at $7.386 billion; ISS is a subset of OM&S. Decisions made in the ISS phase may result in the Navy buying parts that will receive zero demand. In effect, ISS is a birthplace, but not the only birthplace, of some OM&S that are eventually categorized as excess material. A more efficient ISS process would result in lower excess material and financial savings. The data set analyzed contained ISS purchased by both NAVAIR and NAVSEA as well as demand data. Additionally, analysis of current ISS processes at NAVAIR and NAVSEA was conducted. The research resulted in finding that NAVAIR and NAVICP-P have partnered in ISS management. The recommendations are that in transitioning NAVSEA's ISS to NAVSUP a partnership must be formed that develops clear business rules allowing NAVSEA input into ISS management and that NAVICP-M should develop a dedicated staff to provide ISS support to NAVSEA's Program Management Offices.

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AN ANALYSIS OF CURRENT INVENTORY CONTROL AND PRACTICES TO PROVIDE RECOMMENDATIONS ON HOW TO TRANSFER INTERIM SUPPLY SUPPORT FROM NAVSEA TO NAVSUP AND THEN MANAGE THAT MATERIAL

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Submitted in partial fulfillment of the requirements for the degree of

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AN ANALYSIS OF CURRENT INVENTORY CONTROL AND PRACTICES TO PROVIDE RECOMMENDATIONS ON HOW TO TRANSFER INTERIM SUPPLY SUPPORT FROM NAVSEA TO NAVSUP AND THEN MANAGE THAT MATERIAL

ABSTRACT

This project is designed to provide a policy recommendation for transitioning custody of NAVSEA's Interim Supply Support to NAVSUP based on the analysis of current business practices at NAVSEA, NAVICP-P and NAVAIR. NAVSEA has identified that it has OM&S valued at $7.386 billion; ISS is a subset of OM&S. Decisions made in the ISS phase may result in the Navy buying parts that will receive zero demand. In effect, ISS is a birthplace, but not the only birthplace, of some OM&S that are eventually categorized as excess material. A more efficient ISS process would result in lower excess material and financial savings. The data set analyzed contained ISS purchased by both NAVAIR and NAVSEA, as well as demand data. Additionally, analysis of current ISS processes at NAVAIR and NAVSEA was conducted. The research resulted in finding that NAVAIR and NAVICP-P have partnered in ISS management. The recommendations are that, in transitioning NAVSEA's ISS to NAVSUP, a partnership must be formed that develops clear business rules allowing NAVSEA input into ISS management, and that NAVICP-M should develop a dedicated staff to provide ISS support to NAVSEA's Program Management Offices.

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LIST OF ACRONYMS AND ABBREVIATIONS

AERP	Advanced Equipment Repair Program
CARPER	Carrier Planned Equipment Replacement Program
CCE	Class Common Equipment
CFM	Contractor Furnished Material
COSAL	Coordinated Shipboard Allowance List
DMI	Direct Material Inventory
DoD	Department of Defense
DoN	Department of the Navy
ERP	Enterprise Resource Planning
FMS	Foreign Military Sales
GOM	Government-Owned Material
ICP	Inventory Control Point
IOC	Initial Operational Capability.
I-NICN	Interim Navy Item Control Number
ISAL	Interim Support Allowance List
ISEAs	In Service Engineering Agents
ISIL	Interim Support Items List
ISS	Interim Supply Support
LEM	Logistics Element Manager
LLTM	Long Lead Time Material
MSD	Material Support Date
MSP	Material Support Program
NAS	Navy Audit Service
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
NAVSUP	Naval Supply Systems Command
NIIN	National Item Identification Number
NSA	Naval Support Activity
OM&S	Operating Material and Supplies.
PEO	Program Executive Office

PMs	Program Managers
PSD	Preliminary Support Document
RIC	Repairable Identification Code
SOM	Sponsor Owned
TIR	Transaction Item Report
TRIPER	Trident Planned Equipment Replacement
WFC	Warfare Center

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–LCDR Steve Osborne

–LCDR Fred Skinner

–LT Ryan Stickel

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–LCDR Steve Osborne

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–LCDR Fred Skinner

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–LT Ryan Stickel

I. INTRODUCTION

A. BACKGROUND OF PROBLEM

Interim Supply Support (ISS) is a category of material that is used to support the installation of new or upgraded systems in the Navy. It is used to supply repair parts for a system from the time when a new system is initially fielded, which is called Initial Operational Capability (IOC), until the system reaches a maturity, called Material Support Date (MSD). At MSD, the Navy Supply System should assume full supply support of the new system. ISS is designed to be an inventory control system that allows the use of standard Navy supply procedures and databases to manage interim support material. These procedures are used to support government-furnished equipment or systems, contractor-furnished equipment or systems, and any other systems or equipment acquired by the hardware systems commands.

ISS is a subset of material that falls within a larger category called Operating Material and Supplies (OM&S). OM&S is composed of thirteen types of material, each of them assigned a specific reason code. The following list shows the reason codes and types of material they describe:

A Diminishing Manufacturing Sources

B Installation and Checkout (I&C) Spares

C Lab Support Spares

D Initial Load Out Material

E Non-Navy Equipment

F Shipboard Systems & Equipment (Items that are repair and returned)

G Government Furnished Equipment

H Interim Supply Support

I Foreign Military Sales (FMS)

J Insurance Spares/Major Shore Spares

K Staged Material Availability

P Production and Installation Material

R Research and Development

X Excess Material

Currently, there is no standard Navy policy for Interim Supply Support (ISS) management. The Naval Sea Systems Command (NAVSEA) manages ISS through its Program Management Offices, whereas the Naval Air Systems Command (NAVAIR) Program Management Offices work with Naval Inventory Control Point-Philadelphia (NAVICP-P). NAVICP-P has a dedicated team that manages ISS for NAVAIR (for more detail on the relationship between NAVSEA, NAVAIR, and NAVSUP and the Navy Organization as a whole, please see Appendix A).

The Naval Sea Systems Command (NAVSEA) has identified that it has OM&S valued at $7.386 billion (NAVSEA, 2004). ISS is reason code H, and a subset of OM&S. Decisions made in the ISS phase may result in the Navy buying parts that will receive zero demand. In fact, ISS is a birthplace, but not the only birthplace, of some OM&S that are eventually categorized as excess material. A more efficient ISS process would result in lower excess material and financial savings.

The Naval Supply Systems Command (NAVSUP) and NAVSEA are currently negotiating for NAVSUP to take physical custody of NAVSEA-owned OM&S material. NAVSEA will still have control over how this material is utilized, but NAVSUP will control the day-to-day management of this material. NAVSUP has neither policy nor doctrine in place to guide this change in custody. The desired end result of this project is to help NAVSUP and NAVSEA develop a policy that results in a more efficient ISS process and saves taxpayer money.

Currently, NAVSEA manages and accounts for project and plant stock at its Warfare Centers (WFC), Shipyards, Naval Support Activities (NSAs), and General Fund (GF) sites in addition to ensuring management of NAVSEA material held by Naval Inventory Control Point Mechanicsburg (NAVICP-M). Some of the material

management programs under the purview of NAVSEA include the following: Carrier Planned Equipment Replacement Program (CARPER), Submarine Corporate Component Repair Program (SCRP), Advanced Equipment Repair Program (AERP), Trident Planned Equipment Replacement (TRIPER) Program, Long Lead Time Material (LLTM) Program, Material Support Program (MSP), Class Common Equipment (CCE), Naval Shipyard Direct Material Inventory (DMI), Naval Shipyard Future Use Material (FUM), Interim Supply Support and Naval Shipyard Shop Stores. Currently not all of the legacy material logistics programs that manage this material are planned for transition to Navy ERP (Stahl, 2010).

With the rollout of Navy ERP, OM&S management will be transitioned from the various legacy systems used today to Navy ERP. The functionality required to manage Project and Plant stock within Navy ERP currently exists but is limited; understanding its ability to meet NAVSEA's complex material logistics requirement has been a herculean effort by the NAVSEA Supply team. Currently, Architecture of Integration Information Systems (ARIS) models walk-through and training materials do not exist to the degree of detail provided for other Navy ERP functionality. NAVSUP was funded for inventory management modules of Navy ERP that NAVSEA was not funded for. NAVSEA was only funded for a limited Inventory Management (IM) functionality. (Stahl, 2010)

B. STATEMENT OF PROBLEM

NAVSEA Instruction 4440.24D states:

> The Naval Audit Service (NAS) conducted an audit of the NAVSEA Warfare Canters between June 1995 and January 1997 to determine if management, control and accounting of sponsor assets were adequate. The audit found varying degrees of problems associated with SOM. (Naval Sea Systems Command [NAVSEA],2004)

Further, on 7 January 2011, the GAO is report (GAO-11-240) that stated:

> DoD reported that it currently manages more than 4 million secondary inventory items valued at more than $91 billion as of September 2009. However, DoD reported that $10.3 billion (11 percent) of its secondary inventory has been designated as excess and categorized for potential reuse or disposal. (Government Accountability Office [GAO], 2011, p. 1)

NAVSEA currently holds approximately $7.386 billion of OM&S inventory, of which a significant portion is ISS. NAVSEA and NAVSUP's combined objective is to transfer custody of various types of Operating Materials and Supplies (OM&S) from NAVSEA to NAVSUP but still have NAVSEA retain control of OM&S use. No lessons learned, best practices, policies or doctrines currently exist to model or guide this move. This project will focus on the transition ISS to NAVSUP's management.

C. HISTORY

Previously, NAVSEA and NAVAIR had similar ISS processes where the Program Managers had total control of the ISS process. At that point in time, NAVAIR Program Managers often used contractor support to provide ISS. There were issues with cost and a poor interface with the Navy supply system prior to the Material Support Date (MSD). MSD is the date upon which the Navy takes full responsibility for the supply support of a system. NAVSUP cannot direct NAVAIR or NAVSEA to do anything without their agreeing to the action. NAVSUP can put a policy in the instruction, but cannot enforce that policy. This resulted in a Chief of Naval Operations directive to reduce costs by improved supply management (Sayen, 2001). NAVAIR, NAVSUP, and NAVICP-P (at that time called the Aviation Supply Office) formed a working group to standardize ISS across all NAVAIR Program Management Offices. At NAVAIR a Program Management Office was at that time and still is responsible for all aspects of a particular aviation systems life cycle management.

The working group developed several recommendations that were put into action. ISS was to be managed at NAVICP-P under the cognizance of an ISS Coordinator. This coordinator coordinates with 35 Logistics Element Managers (LEM) to ensure they work closely with the Program Management Offices for ISS support. The LEMs are assigned to specific Program Management Offices and are responsible for purchasing and inventory management of all ISS material for these Program Management Offices.

Further, all ISS material was to be warehoused centrally through an ISS Oversight Center utilizing two warehouses: one in Beaufort, South Carolina, and one in North

Island, California. These warehouses hold an inventory that currently consists of over 31,000 different National Stock Number (NSN) items valued at $322 million (Sayen, 2011).

D. PURPOSE OF STUDY

This study examines current business rules and procedures used by NAVAIR and NAVICP-P to manage aviation ISS as well as NAVSEA to manage surface ISS. The goal is to provide recommendations on developing a more efficient ISS system. Specifically, it will address the feasibility of NAVSUP and NAVSEA tailoring policies similar to NAVAIR and NAVICP-P for the management of NAVSEA owned ISS after transferring OM&S custody from NAVSEA to NAVSUP. There is much to be learned from successful practices at NAVAIR to ensure that the change in custody is successful and the ISS process is more cost efficient.

E. SIGNIFICANCE OF PROBLEMS

Excess inventory valued in the billions of dollars is an unacceptable practice that needs to be remedied. NAVSUP has been identified as the subject matter expert in inventory management. Their stated mission is:

> With headquarters in Mechanicsburg, Pa., and employing a worldwide workforce of more than 24,000 military and civilian personnel, NAVSUP oversees logistics programs in the areas of supply operations, conventional ordnance, contracting, resale, fuel, transportation, and security assistance. (Naval Supply Systems Command [NAVSUP], 2011)

As a result of this expertise, NAVSUP has been identified by NAVSEA as more capable of managing OM&S (NAVSUP, 2011). NAVAIR and NAVSUP have partnered and have demonstrated exceptional inventory-control practices. This project team will analyze these practices to determine if similar practices can be implemented in this change of OM&S custody. Currently, there are no policies in place to help NAVSUP and NAVSEA implement a similar arrangement.

GAO report GAO-11-240 stated that:

> Since 1990, we have identified DoD supply chain management as a high-risk area due in part to ineffective and inefficient inventory management practices and procedures, weaknesses in accurately forecasting demand for spare parts, and challenges in achieving widespread implementation of key technologies aimed at improving asset visibility. These factors have contributed to the accumulation of billions of dollars in spare parts that are excess to current requirements (General Accounting Office [GAO], 2011, p. 1).

While there are differences of opinion between the Department of Defense (DoD) and GAO about the disposition of excess material, there is agreement that reducing the amount of material DoD buys that ultimately becomes excess will free up money to spend on actual needs. GAO specifically stated, "Inaccurate demand forecasting is the leading reason for the accumulation of excess inventory (GAO, 2011)." Developing a more effective plan for ISS will have positive effects on excess inventory.

F. RESEARCH QUESTIONS

1. To what extent will NAVSEA and the Department of the Navy benefit from partnering with NAVSUP for ISS management?
2. How effective is the partnership that currently exists between NAVSUP and NAVAIR for ISS Management?
3. Is greater inventory control by NAVSEA and NAVSUP possible within established guidelines or does a new process need to be developed?

G. SCOPE

This study does not cover all businesses' best practices in inventory control. The interviews in this study were conducted in military-sanctioned entities, and results may not be universal to general business practices. This study does not outline the course of action to improve ISS management in NAVSEA or NAVSUP, but it provides recommendations useful to improve current ISS practices and policies.

H. SUMMARY

This study is divided into five chapters. Chapter I addresses the background of the problem and significance of researching best practices in inventory control to guide

NAVSEA's movement of OM&S to NAVSUP. It is designed to help the reader gain insight on the dilemma NAVSEA currently faces with $7.386 billion in OM&S and how partnering with NAVSUP can provide improvements to ISS management and a more cost effective process. Chapter II identifies the foundation for the literature review as it focuses on these major areas of this study. Chapter III will be the methodology used to answer the research questions. Chapter IV will be analysis of the data we have collected. Chapter V will provide recommendations about ISS management and areas of follow-on study.

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II. REVIEW OF INSTRUCTIONS, AUDITS AND PROCEDURES

A. INSTRUCTIONS

The Navy has numerous instructions governing OM&S. Each hierarchical level has some sort of overarching instruction for its organization and suborganizations. Overall guidance is provided by Congress and the president to DoD. DoD then refines that guidance for each service. Each service further interprets the guidance and passes it on. This process continues to the unit and even individual level. This review will now cover guidance from the more senior levels of DON; including Secretary of the Navy Instruction 4440.33 (SECNAVINST 4440.33), Secretary of the Navy Instruction 4440.33A (SECNAVINST 4440.33A), Naval Sea Systems Command Instruction 4440.24D (NAVSEAINST 4440.24D), Naval Supply Systems Command Instruction 4400.93A (NAVSUPINST 4400.93A) and NAVAIR's CAO CONOPS: Competency Aligned Organization Concept of Operation for the Naval Air Systems Command and the Affiliated Program Executive Offices.

1. SECNAVINST 4440.33

SECNAVINST 4440.33 entitled, "Sponsor-Owned Material, Government-Owned Material And Plant And Project Stock Management," was released on 11 February 2009. It is currently under revision, which is unusual after such a short period. The instruction applies to all naval activities related to acquisition, research and development. This revision will be addressed in the discussion of the SECNAVINST 4440.33A. The overarching policy is to minimize SOM/GOM inventories by ensuring that the best value life-cycle cost analysis, including holding cost, is utilized to meet acquisition and demand profiles for specific programs and systems. The secondary policy objectives are to maximize redistribution of SOM/GOM assets while maintaining accountability and maximum visibility. The tertiary policy objective is to dispose of excess, unrepairable, and obsolete (E,U&O) material in accordance with the given rules and regulations. The remainder of the instruction details specific actions and responsibilities of Program

Exectutive Offices (PEOs) and Program Managers (PMs). While this instruction requires reporting of SOM/GOM, there are no clearly delineated repercussions for a failure to comply with the instruction.

2. SECNAVINST 4440.33A

SECNAVINST 4440.33 had several weaknesses that were identified by both the Naval Audit Service and the GAO. SECNAVINST 4440.33A is a revision of SECNAVINST 4440.33 that addresses the weaknesses. This is a draft copy, it is not official yet, and could still be changed. The major aspect of the draft instruction is that it delineates repercussions for failure to comply with the instruction. It also clearly delineates the reporting requirements and to whom the reports are required to be made. A specific quote from the instruction is that, "Noncompliance to this instruction may lead to ASN(RD&A) designating this as an 'area of interest' for NAVAUDSVC follow-up audits." This instruction also specifically changes SOM/GOM to OM&S because it is the proper financial accounting term for this type of material (SECNAV, 2011).

3. NAVSEAINST 4440.24D

NAVSEA issued NAVSEAINST 4440.24D, Sponsor Owned Material (SOM) Management on 20 December 2004. It defines procedures for control, management, visibility, accountability, and access to SOM while assigning responsibility and establishing policy. The goal is to accurately record and report SOM inventory and financial reports to optimize visibility and accountability through total asset visibility procedures. Successfully utilizing this instruction will allow the determination of retention levels of SOM necessary to support all requirements while minimizing inventory levels through responsible means of disposal. This instruction does not pertain to nuclear propulsion material or conventional ammunition. As with SECNAVINST 4440.33, there are no consequences for failure to comply with the instruction. It requires a lot of reporting and data collection, but it never specifies to whom to report the data, or consequences of failure to report. Consequently, this lack of centralized reporting has posed challenges in data collection about OM&S (NAS, 2010). Another weakness of this instruction is that it provides direction for actions that NAVSEA is requiring NAVSUP to

complete. NAVSUP is an equivalent command and is not required to comply with the direction of NAVSEA. There is no indication that NAVSUP agreed to take the action required by this instruction.

4. NAVSUP 4400.93A

The Naval Supply Systems Command has an instruction governing ISS, NAVSUP 4400.93A issued on 12 October 1999 and entitled, "Interim Supply Support (ISS) for Weapon System and Equipment." It provided policy on the use of ISS and a plan for an orderly transition from ISS to full government support. The instruction directs Hardware Systems Commands such as NAVSEA and NAVAIR to include ISS planning and transition at the Material Support Date (MSD) in their acquisition process. Once again, it is important to note that NAVSUP cannot direct NAVSEA without NAVSEA concurrence.

5. CAO CONOPS: Competency Aligned Organization Concept of Operations for the Naval Air Systems Command and the Affiliated Program Executive Offices, 25 August 2010

This manual describes the Competency Aligned Organization Concept of Operations (CAO CONOPS) used by NAVAIR and the PEOs, which emphasizes the shared relations of each of the three fundamental CAO CONOPS elements; competencies, PEOs and Program Management Offices, NAVAIR Headquarters, Warfare Centers, and Fleet Readiness Centers. NAVAIR transitioned to a competency aligned organization between 1995 and 1997. This transition was the a result a 1989 Defense Management Review (DMR), which called for streamlining the acquisition chain, eliminating time-consuming bureaucracy, consolidating related functions, and lowering costs through personnel reductions. Aviation Program Executive Offices were established to manage major acquisition programs and systems acquisition. NAVAIR devised and put into practice a new way of operating founded upon the three fundamental elements: competencies; Program Executive Offices and Program Officers; and NAVAIR Headquarters, Warfare Centers and Fleet Readiness Centers.

Integrated Program Teams (IPT) were put into place to plan, manage, and carry out acquisition and life cycle management. IPTs are product-focused and responsible for meeting the cost, schedule, and performance guidelines of their programs. Team members come from different competencies and work together as a team but do not work directly for the IPT Lead: they are responsible to their boss in the functional area that provided the team member to the IPT. NAVAIR Headquarters (HQ), Naval Air Warfare Centers (NAWC), and Fleet Readiness Centers (FRC) are the major components of NAVAIR's command structure and are centers of capability that provide IPT members. Figure 1 illustrates the operating principles that guide NAVAIR.

This manual is one of the most useful sources of information found for this project. It is not a step-by-step description of how NAVAIR conducts day-to-day business, it is a philosophy of why NAVAIR conducts business as it does.

OPERATING PRINCIPLES

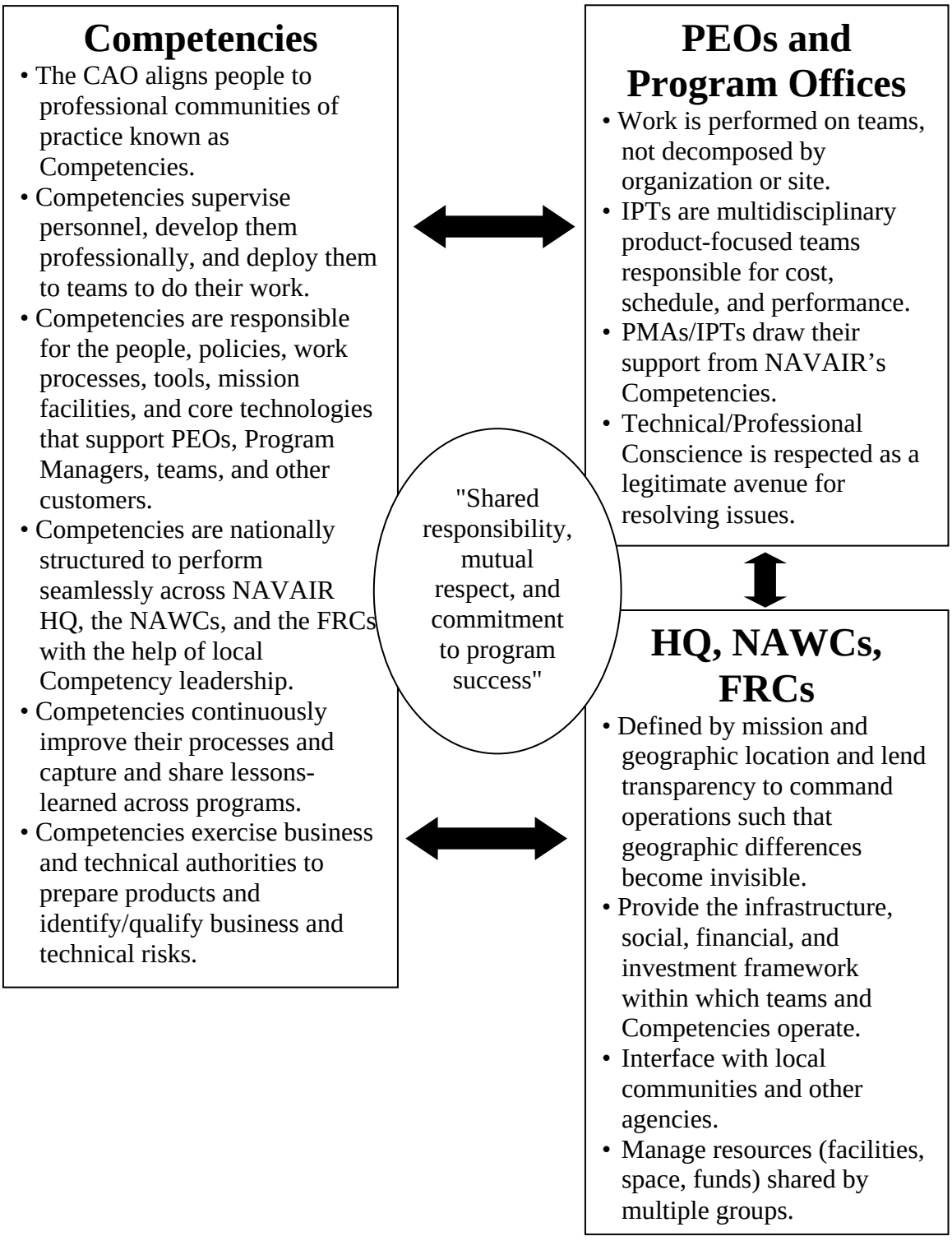

Figure 1. NAVAIR Operating Principles (From NAVAIR, 2010)

B. AUDITS

This section addresses several recent and specific audits of DoD inventory management, and the recommendations from those audits. Specifically, it reviews two GAO reports, a Naval Audit Service report and a DoD commissioned study conducted by the Logistics Management Institute. Each of these reports provides very useful insight into ISS management, further motivating our study.

1. GAO Report: Defense Inventory Management Actions Needed to Improve the Cost Efficiency of Inventory

In its report "Defense Inventory: Management Actions Needed to Improve the Cost Efficiency of Inventory," published in December 2008, the United States, Government Accountability Office (GAO) classified the Department of Defense's (DoD's) inventory management as a high-risk area (GAO, 2008). Specifically, the Navy has experienced inventory deficits as well as excess inventory during the examination time period (GAO, 2008). The purpose of the examination was to identify inventory validities while ensuring good stewardship and fiscal practice.

GAO found that the Navy's inventory management did not align with the requirements spanning from 2004–2007. They also found that demand forecasting effectiveness was limited and requirements for items changed frequently after purchasing decisions were made. The examination identified billions of dollars in excess inventory when compared against the annual requirements listing, which was due to a lack of adjustment of certain inventory management practices in response to unpredictability in demand. GAO recommended that the Navy strengthen its inventory management by incorporating cost efficiency metrics and goals, evaluating and improving demand forecasting procedures, revising inventory management practices to better accommodate demand fluctuations, and enhancing oversight though the chief and deputy chief management officers (GAO, 2008).

Another specific recommendation was:

> To improve the management of the Navy's secondary inventory, the Secretary of Defense should direct the Secretary of the Navy, in conjunction with the Commander, Navy Supply Systems Command, and

> the Commander, Naval Inventory Control Point, to revise inventory management practices to incorporate the flexibility needed to minimize the impact of demand fluctuations. Specific attention should be given to revising practices regarding initial provisioning management, on-order management, and retention management. (GAO, 2008, p. 5)

This recommendation drives to the heart of this project. Better practices at initial provisioning will result in less excess throughout the Navy Enterprise. However, while this recommendation is for NAVSUP and NAVICP, those entities do not control most initial outfitting. Working with NAVSEA and NAVAIR, which control platform configurations, will yield more fruitful results.

2. GAO Report: DoD'S 2010 Comprehensive Inventory Management Improvement Plan Addressed Statutory Requirements but Faces Implementation Challenges.

In 2011, GAO released a study titled, "DoD's 2010 Comprehensive Inventory Management Improvement Plan Addressed Statutory Requirements But Faces Implementation Challenges." This report found that DoD spends billions on material that is later found to be excess. DoD reported,

> it currently manages more than 4 million secondary inventory items valued at more than $91 billion as of September 2009.1 However, DoD reported that $10.3 billion (11 percent) of its secondary inventory has been designated as excess and categorized for potential reuse or disposal. (GAO, 2011, p. 1)

Further, $15.2 billion exceeds the authorized allowance but is categorized as an economic retention item. Economic retention is used for low dollar value items where the re-procurement cost is anticipated to exceed the holding cost. Basically, across DoD there is over $25 billion in excess secondary inventory. Section 328 of the National Defense Authorization Act (NDAA) for Fiscal Year 2010 required the Secretary of Defense to provide Congress with a plan for how to reduce the inventory of excess material. In accordance with the NDAA for Fiscal Year 2010, the Department of Defense developed a plan that addressed the eight required elements of the law and included an additional ninth element that was not required by law. The nine elements are (GAO, 2011, p. 5):

(1) A plan for a comprehensive review of demand-forecasting procedures to identify and correct any systematic weaknesses in such procedures, including the development of metrics to identify bias toward over-forecasting and adjust forecasting methods accordingly.

(2) A plan to accelerate DoD's efforts to achieve total asset visibility, including efforts to link wholesale and retail inventory levels through multi-echelon modeling.

(3) A plan to reduce the average level of on-order secondary inventory that is excess to requirements, including a requirement for the systemic review of such inventory for possible contract termination.

(4) A plan for the review and validation of methods used by the military departments and DLA to establish economic retention requirements.

(5) A plan for an independent review of methods used by the military departments and the DLA to establish contingency retention requirements.

(6) A plan to identify items stored in secondary inventory that require substantial amounts of storage space and shift such items, where practicable, to direct vendor delivery.

(7) A plan for a comprehensive assessment of inventory items that have no recurring demands, including the development of (a) metrics to track years of no demand for items in stock; and (b) procedures for ensuring the systemic review of such items for potential reutilization or disposal.

(8) A plan to more aggressively pursue disposal reviews and actions on stocks identified for potential reutilization or disposal.

(9) A Plan to Address Cross-Functional Improvements for Inventory Management.

This study evaluated DoD's plan and determined that it is aggressive and will be challenging. During an oral debriefing, the Deputy Assistant Secretary of Defense for Supply Chain Integration stated, "DoD is fully engaged in executing the plan to improve inventory management practices (GAO, 2011, p. 8)." This report was very useful for providing overall prospective of DoD inventory management.

3. Naval Audit Service Report: Reporting of Sponsor-Owned Material and Government-Owned Material

The Naval Audit Service, at the direction of the Deputy Assistant Secretary of the Navy (Acquisition and Logistics Management), conducted an audit of SOM management in 2010. This audit, entitled, "Reporting of Sponsor-Owned Material and Government-

Owned Material (Audit Report N2011-0011), was released on 22 December 2010. It focused on measuring compliance with SECNAVINST 4440.33, which was developed to help the Navy meet statutory financial accounting standards of the Chief Financial Officer Act of 1990. The auditors selected three Program Executive Offices (PEO) to review; PEO Integrated Warfare Systems, PEO Carriers, and PEO Land Systems (Marine Corps). The audit found that, while the requirements of SECNAVINST 4440.33 were adequate to meet the needs, they were unclear as to who should review the report. Additionally, while the instruction required reporting of SOM/GOM, there were no clearly delineated repercussions for a failure to comply with the instruction. Finally, the audit found that while auditing only 5% of the DON PEOs/PMs their data accuracy was projected to be 98.6% accurate (NAS, 2010). The Naval Audit Service found that DATA were not reported due to a lack of clarity in the instruction. Specifically:

> We determined, through discussion with the PEOs and PMs, that their reason for not reporting SOM/GOM was the lack of clarity and direction in the SECNAVINST regarding reporting requirements. We also conducted an online survey, contacting non-reporting PEOs'/PMs' points of contact to further determine the problem. The responses indicated a lack of understanding of the definition of SOM/GOM, and that PEOs'/PMs' data was not being relayed to DASN (A&LM). Because 95 percent of PEOs/PMs did not report SOM/GOM data, DASN (A&LM) cannot ensure that DON is utilizing SOM/GOM to meet Fleet material requirements. (NAS, 2010, p. 2)

Basically, they cannot verify that SOM/GOM is being managed effectively due to issues with the SECNAV instruction. As a result, SECNAVINST 4440.33 is currently under revision.

4. Logistics Management Institute Report: Life Cycle Forecasting Improvement: Causative Research and Item Introduction Phase

As previously mentioned, the National Defense Authorization Act of 2010 required DoD to develop a plan to improve government inventory management. Prior to this, the Office of the Secretary of Defense hired Logistics Management Institute (LMI), a Virginia-based consulting company, to conduct a study on demand forecasting for secondary inventory. LMI states that, "improved forecasting should reduce inventory

excesses and shortfalls and, thereby, provide for more effective and efficient materiel support" (Logistics Management Institute [LMI] 2010)." Subsequently, the LMI study became part of the congressionally mandated DoD plan for improving inventory management. Appendix D of the report specifically addresses interim support. The report provides a very good overview of interim support but has one major fallacy. The fallacy is that the LMI report states:

> Maritime programs rarely use ISS because the need for interim support for ships is less for several reasons. First, the long lead times required to activate a new ship generally provide sufficient time to acquire and stock its initial outfitting list before the ship begins operations without the need for interim support. Secondly, due to comparatively low demand rates and space availability constraints aboard ships, maritime systems have lean retail stocks and rely primarily on wholesale stock for support. (LMI, 2010, p. D-1)

While the long lead time does allow sufficient time at initial construction, this statement assumes that the ship's configuration is static throughout its life cycle. Ships are continually upgraded and new systems are added after a ship is built. Further, NAVSEA does use ISS, but unlike NAVAIR it is not a centralized process, it is conducted by the individual program offices. The space constraints and low demand on ships are poor arguments because the low numbers of ships procured makes the ISS process even more important for maritime programs. Finally, ISS allows time for the wholesale system to respond to upgrades and installations. If ISS is not used, the ship may find itself in the position of needing parts that the wholesale system does not know are needed.

C. PROCEDURES

This paper focuses on NAVAIR and NAVSEA ISS processes. As such, it is important to understand how each activity performs its ISS functions. This section reviews the current process at both NAVAIR and NAVSEA; Chapter IV, which discusses our findings, discusses the process in depth. This is provided to give a general overview.

1. NAVAIR Interim Supply Support

NAVAIR uses a third-party logistics contractor that utilizes two contractor-operated warehouses to store and distribute ISS inventory. These warehouses are located in Beaufort, South Carolina and North Island, California, shown in Figure 2. These ISS warehouses act as stock points for contract receipts and for satisfying fleet Interim Support Allowance List (ISAL) requisitions. NAVAIR has further partnered with NAVICP-P for the management of the ISS items. NAVAIR utilizes a functional area organization where each function is defined by a numerical code. NAVAIR 6.8.2 is the Logistics office that specifically deals with ISS. It retains overall control of the process and financial responsibility. NAVAIR 6.8.2 is located at NAVAIR headquarters in Patuxent River, Maryland.

The contractor facilities are straightforward. They warehouse, inventory, and issue material in accordance with NAVAIR's direction. This direction comes from NAVICP-P where the actual inventory management occurs. When an item is purchased, it is shipped directly to the contractor warehouse and when an issue is needed the issue paperwork is sent to the contractor warehouse. This provides a centralized location and the ability to easily track ISS through all phases from acquisition to end usage. Additionally, the contractor runs a website, http://www.navairiss.com, which allows an authorized user to query the physical status of NAVAIR's ISS.

Management at NAVICP is conducted through a team known as Logistics Elements Managers (LEM). NAVICP has thirty-five LEMs assigned to individual projects (Saywn, 2011). Even though the LEMs are NAVICP employees, it is clear from our conversations that they view themselves as part of the NAVAIR team. LEMs coordinate with the Program Management Offices and come to an agreement with the Program Management Offices as to the quantity and selection of spare parts to buy for the ISS period. Once a specific LEM has concurrence from the Program Office, the LEM will make the purchase. For extended ISS periods, the LEMs may budget and buy for multiple years.

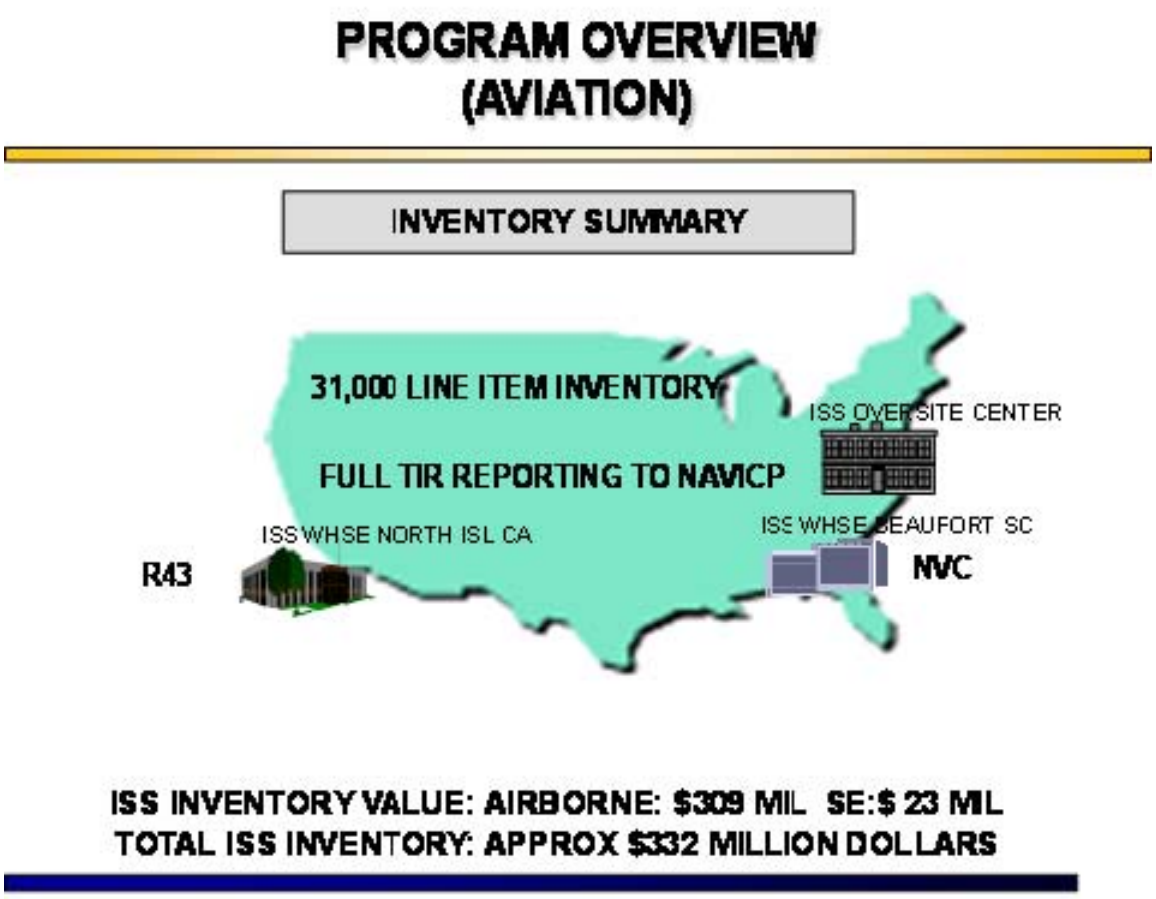

Figure 2. Locations of ISS Contractor Facilities (From Sayen, 2001)

2. NAVSEA Interim Supply Support

While NAVAIR ISS is centrally managed and planned, NAVSEA has maintained the very Navy-centric idea of delegating to the lower level. At NAVSEA, the individual program offices are responsible for their own ISS and determine how they want to manage it. While NAVSEA has several facilities similar to NAVAIR's facilities, they are not mandated for use. Some program offices work closely with NAVICP Mechanicsburg (NAVICP-M) for their ISS while others choose to maintain strict control of their ISS.

The ISS process at NAVSEA begins with the program office deciding to install new equipment. At this point, the program managers prepare a Program Support Data (PSD) sheet for procurement of spares and repair parts (Cutchall, 2010). The PSD is how

budget requests are tracked by the comptrollers at NAVSEA. Once funding is provided, the program offices can chose to work with NAVICP-M for their ISS purchases, or they can use their own personnel to make purchases and manage their ISS inventories. Naval Sea Logistics Center (NSLC) is a NAVSEA organization in Mechanicsburg, PA next door to NAVICP-M, acting as an interface between NAVSEA program offices and NAVICP. Further, NSLC tracks and maintains logistics data for NAVSEA. NSLC has identified that when the program offices manage their own ISS, it sometimes leads to a gap at the material support date (MSD), leaving the NAVICP unaware of the new system being installed, and unprepared to assume organic support for the new system.

NAVSEA sponsors a program called Push to Pull. This program receives material at a NAVSEA Staging Facility and holds it until it needs to be issued to the ships. This is similar to the central management conducted by NAVAIR and can alleviate the aforementioned issue of material not being available at MSD because when a program uses the Push to Pull program NSLC coordinates with NAVICP to assure a seamless transition at MSD. Ultimately, the choice to use the Push to Pull program rests with each individual program office; therefore, the results of the Push to Pull program are mixed.

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III. METHODOLOGY

A. RESEARCH QUESTION

The remainder of this paper examines current business practices of NAVAIR and NAVSEA in order to make a policy recommendation as to how to best transfer ISS material custody from NAVSEA to NAVSUP while maintaining NAVSEA control of the disposition of that material. This project started looking at the overarching concept of OM&S which has been highly criticized by the Government Accountability Office and Naval Audit Service for the amount of excess material in this category. It was narrowed to ISS, a subset of OM&S because OM&S was too diverse to effectively be examined in one project.

Dr. Keebom Kang, a professor at the Naval Postgraduate School wrote a technical report for the Deputy Under Secretary of Defense for Logistics in 1998 entitled "DoD Inventory Management Cultural Changes and Training in Commercial Practices." It found thirteen causes of DoD excess inventory (Kang, 1998, pp. 12–13):

1. Incentives for Item Managers, Supply Personnel and Users
2. Unpredictable Demand and High Stockout Cost
3. Lack of Asset Visibility
4. Government Contracting Regulations
5. Monopsony and Lack of Competition
6. Inexperienced Personnel and High Personnel Turnover and Multiple Inventory Managers
7. National Stockpile Requirements and Economic Considerations
8. Geographically Dispersed Commitments and Separate Service Transportation Networks
9. Decrease in Requirements and Base Realignment and Closure (BRAC)
10. Lack of Customer Confidence and Receiving the Wrong Consumable Part

11. Support of Allies

12. Poor Estimates During Initial Procurement Planning

13. Demilitarization Costs

Of these thirteen causes, three provide a useful framework with which to examine the ISS transition and how best to accomplish it. The three causes are: Incentivizing Item Managers, Supply Personnel and Users; Lack of Asset Visibility; and Poor Estimates During Initial Procurement Planning. The other ten causes of excess material are important but not as relevant to the analysis of how to transition ISS to NAVSUP custody. The data analysis examines the visibility of ISS while review of policy will examine the incentives for item managers and estimates during initial procurement planning. Process mapping was conducted to develop a clear picture of how processes work at NAVSEA and NAVAIR.

B. DATA ANALYSIS

This project examined both numerical data and process flows from NAVSEA and NAVAIR. The data specifically examines the material purchased in the interim period and the usage of that material. This data provided visibility about the use of ISS material at both NAVSEA and NAVAIR. Visibility, for this paper, examined the whole of an ISS period and determined what items were utilized compared to the number of items that were procured to support the ISS period. The data analysis conducted will provide a measure of the ISS visibility.

These researchers relied primarily on the use of data collected from the Program Managers and logisticians at NAVAIR, NAVSEA, and NAVSUP. Supply databases and records from NAVSUP, NAVSEA, and NAVAIR program managers were essential to developing a project report analysis and determining the visibility of ISS material. Both NAVAIR and NAVSEA provided this project with a wealth of data about their ISS procurements and demand. The data was provided in a Microsoft Excel format, which allowed for easy analysis. The NAVAIR was obtained from NAVAIR's contractor-run website, www.navairiss.com. Access to this site is limited to official use and must be

obtained in accordance with NAVAIR procedures. This website contains ISS data from 2001 to present day. It allows quick and easy access to on-hand quantities and demand data and provided output as either a Microsoft Excel or Adobe pdf file. NAVSEA's data was not centralized in one database. The personnel at NAVSEA were very helpful and provided a lot of data, but the data sets did not contain individual demand data; instead the demand data provided were a summary of all demand for a particular item. The demand data did not include direct contractor delivery to an end user, warranty work, or depot-level issues. The lack of this important data did not lend itself to determining how effective the inventories were being utilized. Each program maintains its own ISS program and there is not a standard system or format for the data. The NAVSEA personnel who provided the data had to manually extract the data from various systems. These data were consolidated from NAVSEA and NAVICP-M records. It is not inclusive of all NAVSEA ISS, but of major systems from a sample of NAVSEA's programs. This should be sufficient for the level of data analysis used in this project.

C. REVIEW OF POLICY

To better ascertain how the current systems operate, site visits to NAVSEA and NAVAIR were conducted. The purpose of the visits was to analyze current inventory practices and processes with regard to item manager incentives and estimates during initial procurement planning. A detailed review of current instructions and command policies that govern OM&S disposition was conducted. Day-to-day operations were assessed and documented, which enabled researchers to collect data and obtain a thorough understanding of organizational inventory procedures and what motivates item managers to take the actions they take.

D. PROCESS MAPPING

Process mapping takes complex written instructions and provides a visual flow chart that allows users to more easily understand the complex facets of a process. We introduce process flow diagrams for the current practices at NAVAIR. NAVSEA does not have a standardized process for the entire enterprise; therefore, a single process flow

for their organization cannot be developed. The process map illustrates how the process currently works and where the process can be enhanced. The process map was developed utilizing existing instructions and policy as well as information provided by program managers and logisticians who currently use these processes in their day-to-day business. It is not directly related to the framework used to examine ISS, but is very helpful for understanding the processes used to manage ISS.

IV. DATA ANALYSIS

A. INTRODUCTION

This chapter focuses on data analysis. As previously mentioned, the data for this project comes from three principal locations: historical numerical data, instructions and policies, and data provided by personnel working at NAVSEA, NAVAIR and NAVSUP. Each of these sources provides an interesting perspective on ISS; each is slightly different, but they all drive to the same points, that visibility is important and the incentives for logistics planners and initial forecasting make a difference in the ISS that is purchased and have caused excess ISS. The data is discussed in the order listed above while the conclusions and recommendations regarding this data is presented in Chapter V.

B. NUMERICAL DATA

1. NAVAIR Data Summary

Using the aforementioned NAVAIR website, a list of 77 active aircraft ISIL header files were downloaded. The header file shows all systems currently being supported using the ISS process and identifies each of them through the use of a ISIL number. After retrieving the list of ISILs the data for each individual ISIL were downloaded in a Microsoft Excel format. Finally, the Issue Report, which contains data about all issues made throughout the ISS period, was downloaded in a Microsoft Excel format. These files were merged into a master file that contained each ISIL with its associated NIINs and the demand data for those NIINs.

The ISIL file provided the following information: ISIL number, National Item Identification Numbers (NIIN), National Stock Number (NSN), the Special Material Identification Code (SMIC), Source Maintenance and Recoverability (SM&R) code, vendor Part Number, Name, Unit of Issue, Unit Price, Net Price, Ship Code, Quantity Ready for Issue, and the quantity Not Ready for Issue. The Unit Price is the cost of a new item with no carcass to turn in, it will be used for initial issues or when the carcass is damaged beyond the capability of repair. The Net Price, is the cost the Navy associates

with a repairable item for which there is a turn-in carcass that can be repaired and returned to the Navy for utilization. This is equivalent to the amount that an auto parts store charges for an item that can be rebuilt and sold. Once consolidated, the 77 different ISILs in this report contained 11,009 individual NIINs, the total dollar value of those NIINs and their on-hand stock levels utilizing the Unit Price was $332,824,233.53.

The issue reports contained the ISIL number against which the issue was made, the Document Number, the NIIN, the Unit of Issue, the Quantity issued, the Unit Identification Number to whom the issue was made, the date of the issue, the Fund Code, Project Code and Issue Priority. The issue report showed a total of 21,640 issues. These issues were recorded over the period of January 2001 until December of 2010. Actual demand is shown in Table 1. The majority of the demand occurred between 2008 and 2010. This is because under most circumstances the ISS period is short. However, there are some outliers. ISIL 00A08 has an Material Support Date of 31 December 2020. This ISIL is an engine for the V-22 Osprey and will continue to be supported through ISS for the next nine years.

Year	Number Issues
2001	777
2002	845
2003	1215
2004	522
2005	944
2006	990
2007	1915
2008	4817
2009	5274
2010	4331

Table 1. NAVAIR ISS Demand for Currently Active ISILs from 2001–2010

The issue reports and the consolidated ISILs were combined in order to analyze the demand and issue data. A method for examining visible consumption was developed to compare the processes at NAVAIR and NAVSEA. The visible consumption was derived by dividing the number of individual NIINs that received demand during the ISS

period by the total number of NIINs purchased for an individual system. Visible consumption only shows if a NIIN has demand, it does not consider multiple demands against a NIIN.

Table 2 shows the visible consumption of each individual ISIL at NAVAIR. After determining the visible consumption of individual ISILs, the mean visible consumption for all 77 was 31.2% with a standard deviation .373 a median of .0784. The maximum consumption was 100% of the original inventory and the minimum consumption recorded was 0%. This was just the visible demand for each ISIL and did not accurately show the number of items purchased that received demand. The same numbers were analyzed again using a different method. The total number of NIINs purchased for all 77 ISILs was divided by the total number of NIINs that received demand for those 77 ISILs. Analysis of the demand data this way showed demand on 66.27% of NIINs. This means that of all ISILs active at the time of data collection, almost 2/3 of the items showed demand. This large deviation can be accounted for by maturity of the system. Figure 3 is a chart that shows the visible consumption (number of NIINs that have received demand) compared to the number of quarters until the system reaches its Material Support Date (MSD). The trend line shows a steady increase from 0% visible consumption for systems that are 34 quarters from MSD to 46% for items that are at MSD. Once again the example of ISIL 00A08, the engine for the V-22 Osprey demonstrates this point. The Logistics Element Managers purchased 514 total NIINs and 213 showed demand for a total of ISS visible consumption of 41.4%. This program has another nine years to improve its ISS effectiveness. The quantity of NIINs in each ISIL did not have a major impact on the demand shown for the ISILs. The mean visible consumption for ISILs that contained ten parts or fewer was 38.5%, for those between 11 and 100 NIINs was 22.4%, and for ISILs with greater than 100 NIINs was 31.1%. This is because the quantity of NIINs in an ISIL is not related to the maturity of the ISIL, it is related to the complexity of the system.

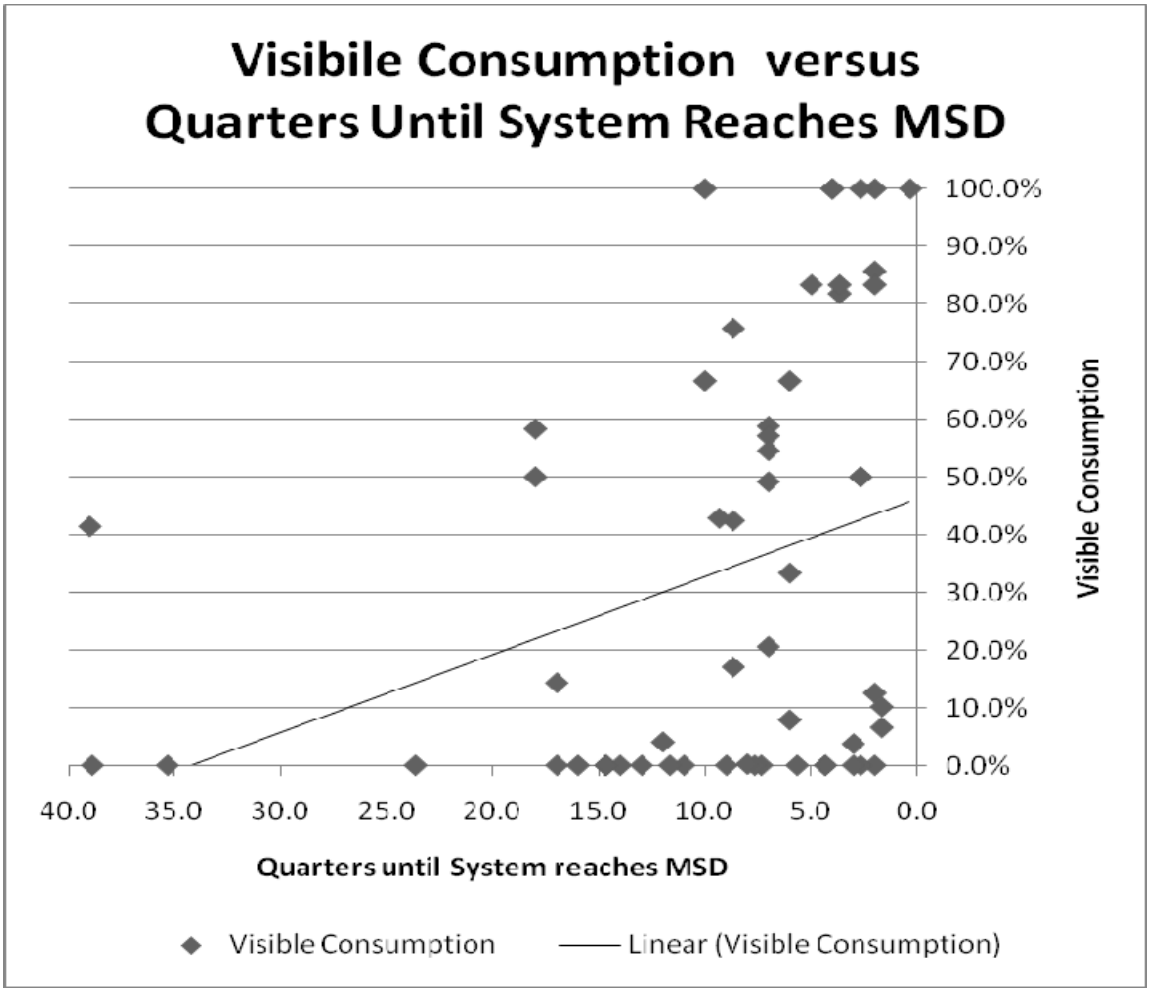

Figure 3. Visible Consumption Versus Quarters Until System Reaches MSD

ISIL	NIINs in ISIL	NIINs with Demand	Visible consumption
00A08	514	213	0.4144
00A64	1	0	0.0000
00A66	508	1	0.0020
00A75	679	0	0.0000
00A80	3	3	1.0000
00A83	94	16	0.1702
00A84	33	14	0.4242
00A85	161	122	0.7578
00A95	3460	1470	0.4249
00A96	3000	1475	0.4917
00A99	14	12	0.8571
00B01	20	0	0.0000
00B03	2	0	0.0000
00B04	1	1	1.0000
00B05	86	10	0.1163
00B07	158	16	0.1013
00B09	4	0	0.0000
00B10	71	2	0.0282
00B12	18	0	0.0000
00B15	28	1	0.0357
00B18	7	0	0.0000
00B21	108	0	0.0000
00B22	12	10	0.8333
00B23	4	0	0.0000
00B24	28	1	0.0357
00B25	3	3	1.0000
00B26	27	2	0.0741
00B28	1	1	1.0000
00B32	172	2	0.0116
00B33	3	1	0.3333
00B34	11	9	0.8182
00B35	6	5	0.8333
00B37	4	2	0.5000
00B38	4	0	0.0000
00B43	3	3	1.0000
00B46	802	32	0.0399
00B47	58	0	0.0000
00B49	12	7	0.5833
00B50	313	184	0.5879

ISIL	NIINs in ISIL	NIINs with Demand	Visible consumption
00B51	21	12	0.5714
00B52	107	22	0.2056
00B53	5	0	0.0000
00B54	8	1	0.1250
00B56	6	5	0.8333
00B57	46	3	0.0652
00B63	22	12	0.5455
00B64	15	5	0.3333
00B65	6	4	0.6667
00B66	7	6	0.8571
00B67	2	2	1.0000
00B68	2	1	0.5000
00B69	2	0	0.0000
00B72	4	2	0.5000
00B75	7	3	0.4286
00B76	1	1	1.0000
00B77	3	0	0.0000
00B78	3	0	0.0000
00B79	3	2	0.6667
00B80	81	0	0.0000
00B83	1	0	0.0000
00B85	51	4	0.0784
00B86	2	0	0.0000
00B87	1	0	0.0000
00B88	2	0	0.0000
00B89	4	4	1.0000
00B90	27	1	0.0370
00B94	5	0	0.0000
00B97	7	1	0.1429
00B98	4	0	0.0000
00C01	21	0	0.0000
00C02	8	0	0.0000
00C03	2	0	0.0000
00C04	1	1	1.0000
00C05	6	0	0.0000
00C06	30	0	0.0000
00C08	16	0	0.0000
00C09	36	0	0.0000
Total	21639	14341	0.6627

Table 2. ISIL Visible Consumption

2. NAVSEA Data Summary

NAVSEA provided data in the form of Microsoft Excel Spreadsheets for this project. NAVSEA personnel had to manually pull the data from various systems. This arduous manual task proved to be very time intensive. The NAVSEA data set contained 2,565 unique Repairable Item Codes (RICs) with a total of 17,225 line items. The RIC is used to identify individual systems, similar to NAVAIR's ISIL. The 17,225 line items contained 7,891 line items with a valid NIIN. Another 9,232 were Interim Navy Item Control Numbers (I-NICNs) identified by the first two characters being LL and followed by an additional six characters. I-NICNs are problematic because they are locally assigned and do not correlate back to the DoD stock system and cannot be requisitioned by the end user using standard requisition procedures. Table 3. is a sample of the data set showing I-NICNs. Finally, 102 were non-NIIN/NICN, they used only an OEM Part Number in the data set's NIIN block. This is more problematic than the use of I-NICNs because different manufacturers will use the same part number to identify different items. Therefore, the OEM must be known when ordering using a part number, and the OEM must still be manufacturing that part. Only 45.8% of the NAVSEA ISS material examined were tracked using valid NIINs. This drives down the visibility of the NAVSEA's data. It is a manually intensive process for NAVSEA and to NAVICP logistics personnel to transition I-NICNs and Local Item Control Numbers to NSNs. Further there is a greater potential for demand data to be lost in the process which will negatively affect allowancing.

RIC	COG	Nomenclature	NIIN	Issue Quantity
88A990205	0J	VALVE THERMAL EXP	LLH556876	8
000A2183	0O	CIRCUIT CARD ASSEMB	LLH562206	8
0R71342008	0J	HDD IBM ULTRASTAR	LLH563033	1
A00575A568	0J	COMPACT DISK	LLH792179	1
H000000385	0O	COMPUTER, DIGITAL	LLH792644	1
00039440	0J	I/O EXPANDER BOARD	LLH7A4133	1
99A000080	0J	TRANSPONDER TST CAB	LLH7A5695	1
005750377	0J	KEYBOARD,DATA ENTRY	LLH7A8281	1

Table 3. Sample NAVSEA Data

Given the aforementioned constraints of the data not showing demand for direct contractor delivery, warranty work, or depot level issues NAVSEA's data the 2565 unique RICs had an average visible consumption of 18.36%. This does not necessarily mean that only 18.36% of NAVSEA's ISS material is being utilized, it only shows that the data provided only accounted for the usage of 18.36% of the material in the 2,565 unique RICs. More items may have been used, but they did not appear in the records. Table 4 shows a summary of the RIC visible consumption. At this point when analyzing NAVAIR's data, the researches took a second measure of visible consumption which was to divide the total number of NIINs that have been retrieved from inventory by the total number of NIINs purchased. When the same analysis was conducted on this data set the resulting visible consumption was 11.2%. The data set did not include the MSD so the analysis of proximity to MSD can only be assumed; it cannot be shown. The number of NIINs, I-NICNs or Part Numbers contained within each RIC does not affect the visible consumption of the individual RICs. There were 2,565 RICs; 2174 RICs contained between 1 and 10 NIINs, I-NICNs or Part Numbers and had a visible consumption of 20.0%, 380 RICs had between 11 and 100 NIINs, I-NICNs or Part Numbers and had a visible consumption of 9.2% and eleven RICs had over 100 NIINs, I-NICNs or Part Numbers and had a visible consumption of 3.2%.

Visible consumption Range	RICs
100%	318
75%-99%	25
50%-74%	141
25%-49%	108
1%-24%	143
0%	1830
Total	2565

Table 4. NAVSEA Visible Consumption Summary

The data also shows that there is a lot of duplication of effort. The 2,565 unique RICs contained a total of 17,225 NIINs, I-NICNs, or Part Number identified parts. Analysis of the data showed that, there were only 9944 unique NIINs, I-NICNs, or Part Numbers. Meaning that the other 7,281 were duplicates and that different programs were managing the same parts. Two of the NIINs appeared in 86 separate RICs. If these two NIINs are truly being managed by 86 individual programs the effort to procure these parts is being duplicated 86 times and NAVSEA is missing out on the opportunity to reduce the labor, lead time, and administrative costs involved in these procurements. Both items are circuit cards and one has a unit price of $11,741 while the other has a unit price of $10,975. Table 5 shows the breakdown of NIINs, I-NICNs and Part Numbers (generically referred to as NIINs) and the number of RICs in which they appear The data shows that 26.08% of NAVSEA NIINs are used in more than one RIC which provides a lot of potential savings if there is consolidation in this area. Dr. Kang's paper stated that once visibility is improved inventory managers can, "reduce total inventory and cost, while improving response time" (1998, p. 10).

Occurrences	NIINs	Percentage
1	7351	73.92%
2 to 5	2283	22.96%
6 to 10	226	2.27%
11 to 50	70	0.70%
50 to 86	14	0.14%
Total	9944	100.00%

Table 5. Occurrences of NIINs in RICs

C. POLICIES

Considering the actual data showing how ISS is managed at NAVSEA and NAVAIR, it is important to examine the instructions and policies that have led to those results. While both organizations have a method for acquiring and managing ISS they are distinctly different. NAVAIR has a standardized and fairly rigid method of managing the ISS process, while NAVSEA places the onus of management on the individual programs. The following is a discussion of the NAVAIR process followed by a discussion of the NAVSEA process.

1. NAVAIR's Capabilities Aligned Organization

NAVAIR is a functional organization that places each function in an Air Number. The Air Numbers are: Air-1.0 Program Management, Air-2.0 Contracts, Air-4.0 Research & Engineering, Air-5.0 Test & Evaluation, Air-6.0 Logistics, and Air-7.0 Corporate Operations & Total Force (NAVAIR, 2011). While each of these elements has its own roles and responsibilities, they are expected to operate collaboratively to balance program cost, schedule, and performance. That said, a degree of constructive tension between them is expected and welcomed (NAVAIR, 2010).

The organizational structure can best be illustrated in Figure 4. In essence, the members of the Integrated Program Teams (IPT) have two different bosses, each with a slightly different objective. This matrix structure intentionally creates tension in the IPT because NAVAIR believes:

> Healthy, constructive debate promotes trust, reveals opportunities and alternatives, forges partnerships, and motivates individual elements to act

as one. Since everyone is associated in one way or another with these elements—aligned to a Competency, supporting one or more PEOs/PMAs and other customers, and conducting their work at HQ, a NAWC, or an FRC—narrow allegiances should more naturally give way to working interdependently for the greater good. (Naval Air Systems Command. [NAVAIR], 2011, p. 5)

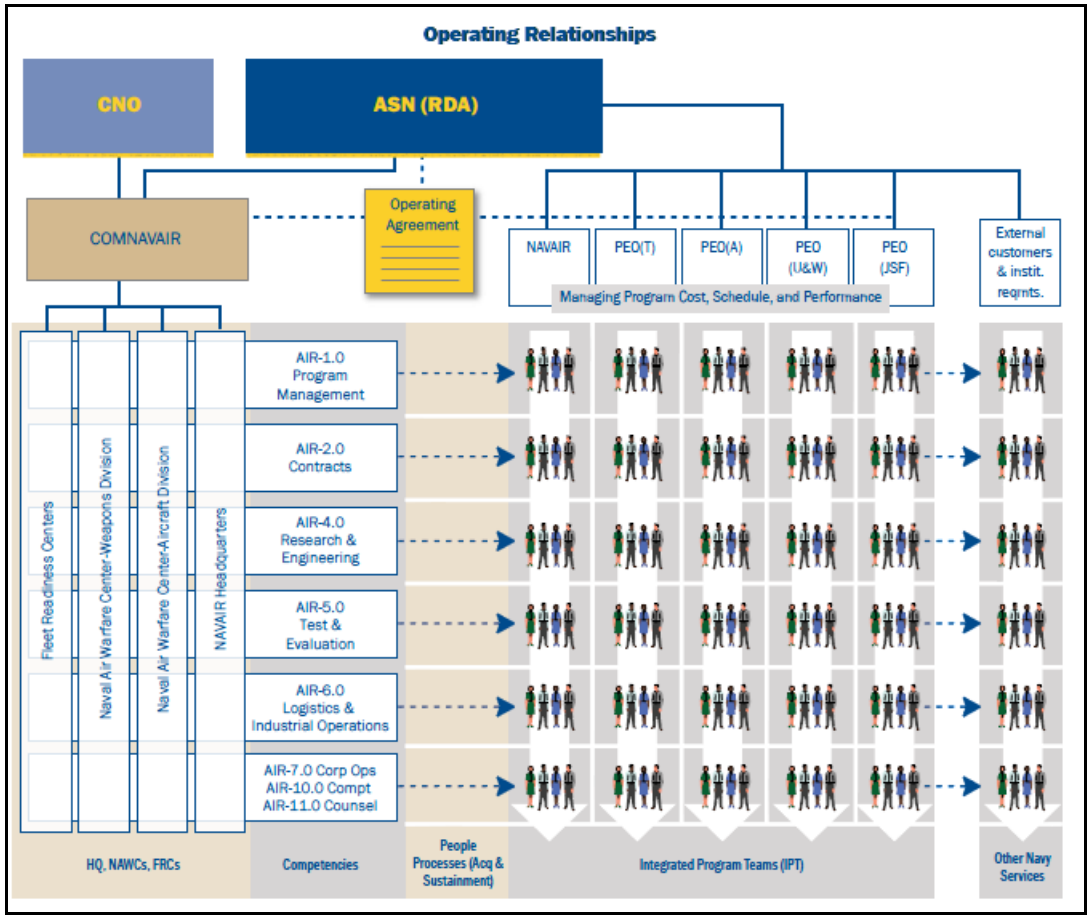

Figure 4. NAVAIR Operating Relationships (From NAVAIR, 2011, p.5).

Basically, NAVAIR has adopted a matrix organization with the philosophy that an Integrated Product Team (IPT) beholden to a single goal or mission will result in an IPT that is not affected by other major areas of concern. When an IPT does not have a single goal, but the goals of each individual in mind, it will work together and make better decisions while striving to complete a mission without sacrificing cost to meet a schedule or achieve performance. This is an important distinction to understand because in this type of environment it is much more difficult for logistics personnel to sacrifice

sound logistics concepts for the purpose of appeasing a Program Manager who wants 100% readiness. Logistics personnel are also responsible to AIR 6.0, which is driven by a slightly different metric that incorporates the effectiveness of logistics purchases. To achieve high levels of readiness, approaching 100% support cost increases drastically because parts that have a low rate of failure are purchased in excess, regardless of its low rate of failure. The desired service level becomes very important in a constrained environment. Figure 5 shows the theoretical relations between requisition fill rates and investment in inventory. It is a generic example and the data does not tie into this report. The key point is that a 100% fill rate is exponentially more expensive than a lower service level that will still meet the program needs.

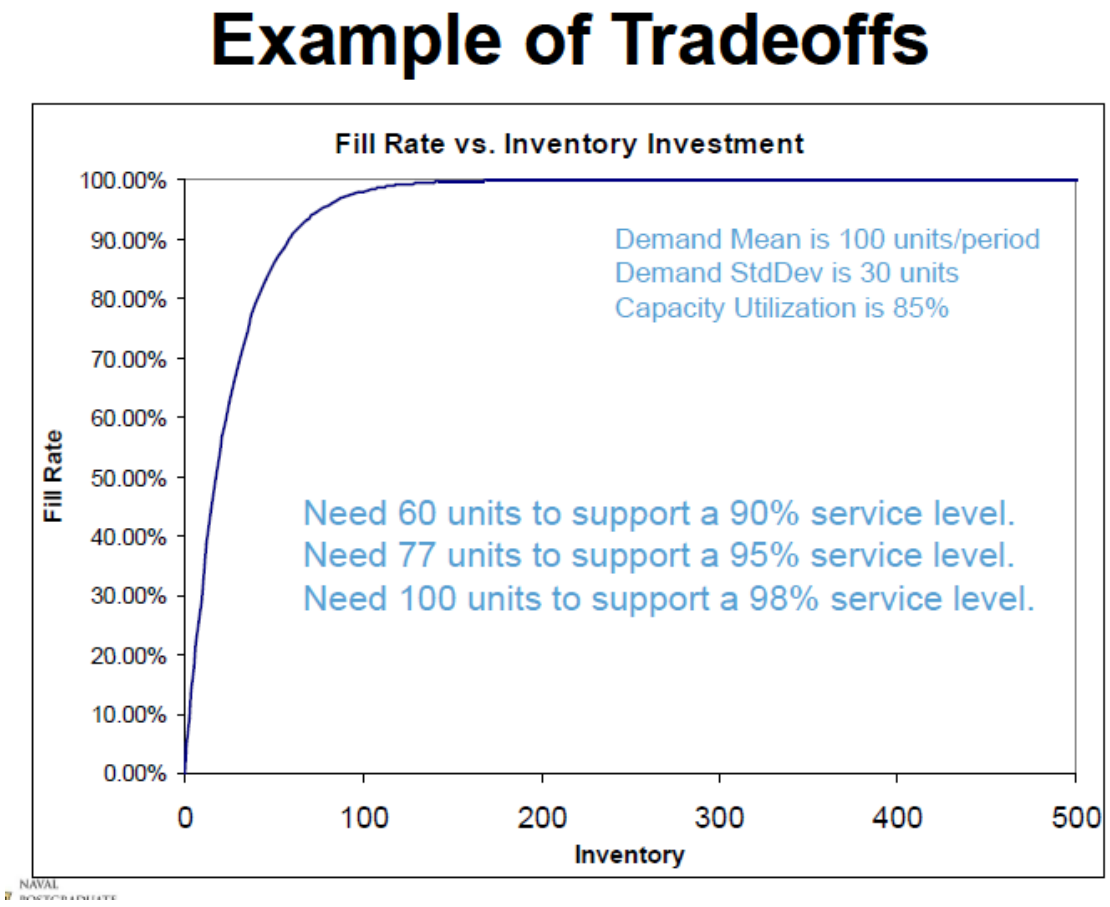

Figure 5. Simplified Example of the Tradeoff Between Safety Stock and Service Level

With regard to ISS, NAVAIR has a straight forward process. It starts with the program office procuring a new system or upgrading an existing system that requires ISS.

The budget for these new systems is not germane to this discussion. Once the budget is approved and the schedule determined, the NAVAIR Assistant Program Manager for Logistics works with the NAVICP LEMs to develop a document called the Provisioning Statement of Work (PSOW). This PSOW is basically a master plan for the new system. There are two key items from the PSOW that are vital to a successful implementation, the Provisioning Performance Schedule (PPS) and the Provisioning Candidate Checklist.

The PPS is a schedule of the specific events with due dates and responsibility assigned to all of the key events and deliverables necessary for provisioning. Figure 6 is a sample PPS taken from the Provisioning Analyst Desk Guide. Neither the Initial Operational Capability nor the MSD show a responsible activity because they are a collaborative effort between NAVAIR, NAVICP, and the Contractor responsible for the implementation of the system. Use of the PPS helps to ensure that the process is completed smoothly and that the milestones for implementation are met.

PROVISIONING PERFORMANCE SCHEDULE (PPS)

End Item: Night Scope Viewing System
Contractor: Bad Eyes Contract Nr: N00019-01-D-E239

RESPONSIBLE ACTIVITY	EVENT	CALENDAR DATE OF EVENT
NAVICP	Issue PSOW	TBD
NAVAIR/Contractor	PSOW Funded	TBD
NAVICP/Contractor	Guidance Conference	TBD
Contractor	Submit Interim Support Items List	TBD
NAVICP	Release Interim Support Items Order	TBD
NAVAIR/Contractor	Product Baseline (PCA/FAT)	TBD
NAVAIR/Contractor	Maintenance Plan Document Approval	TBD
Contractor	Submit PTD and EDFP to NAVICP	TBD
NAVICP	Item Selection Process (ISP)	TBD
NAVICP	Data Validation and Files Load	TBD
NAVICP	Provisioned Items Order (PIO) Release	TBD
Contractor	Interim Support Assets Delivered	TBD
	Initial Operational Capability (IOC)	TBD
Contractor	PIO Asset Delivery	TBD
	Material Support Date (MSD)	TBD

Figure 6. Provisioning Performance Schedule (From NAVAIR, 2008)

The Provisioning Candidate Checklist is a form used to determine if parts should be supported as ISS or if they should be supported through other means. The basic rule is that if an item already exists in the federal supply system it will not be supported as ISS because that particular item is not interim. The full Provisioning Candidate Checklist is included as Appendix C.

2. Logistics Element Managers and NAVICP

In the early 1990s, NAVAIR implemented several changes to its system that improved the oversight and visible consumption of its assets. In 1991, the first dedicated NAVAIR ISS warehouse was opened at North Island, California. This was in response to a NAVAIR working group formed to reduce excess inventory cost. In addition, NAVAIR transitioned from a predominantly on-site contractor supported process for ISS to a system that created more visibility throughout the standard supply system. The transition from contractor support to NAVICP-P allowed for easy tracking, stocking, and recording. In 1994, a second warehouse was added in Beaufort, South Carolina to handle the extra storage requirements needed. In 1994, the functional responsibility for ISS management was outsourced to NAVICP-P, which hired 35 Logistics Elements Managers (LEMs) to carry out the day-to-day management (Sayen, 2010).

NAVAIR has a clear partnership with NAVICP. The LEMs work for NAVICP but interface daily with their specific program offices at NAVAIR. While the LEMs work for NAVICP, and are accountable to NAVICP for their jobs, the funding for the parts they manage is derived from NAVAIR. The programs are NAVAIR programs and, therefore, the LEMs must interface with their NAVAIR program offices to determine requirements and NAVAIR's desires for how funding is to be spent. Once again NAVAIR has pitted two distinctly different goals against one another to ensure an efficient operation.

The LEMs typically have 10 years of item management experience and personalities compatible with customer satisfaction while meeting their NAVICP goals. They have very distinct business rules as to which items will be purchased during the ISS period. The major business rule that affects ISS management is the first question an

LEM asks, “does this part already have a NIIN?” If it already has a NIIN, then the part is not procured as ISS or added to an ISAL. It is referred to the appropriate location for support. This has the effect to limit duplication of effort. If a part is common to all thirty-four LEMs at NAVICP, only one of them will have to support that particular NIIN. Each system will be supported by that person, and all purchases will be grouped to provide better buying power. This also can have the effect of reducing safety stock levels because the safety stock level will not be carried by each LEM; instead, they are pooled centrally. Further, demand data is reliably collected and the aggregate totals allow for better forecasting.

Figure 7 is a flow chart illustrating the NAVAIR Provisioning Candidate Checklist. We created this to show the process and all key decision points.

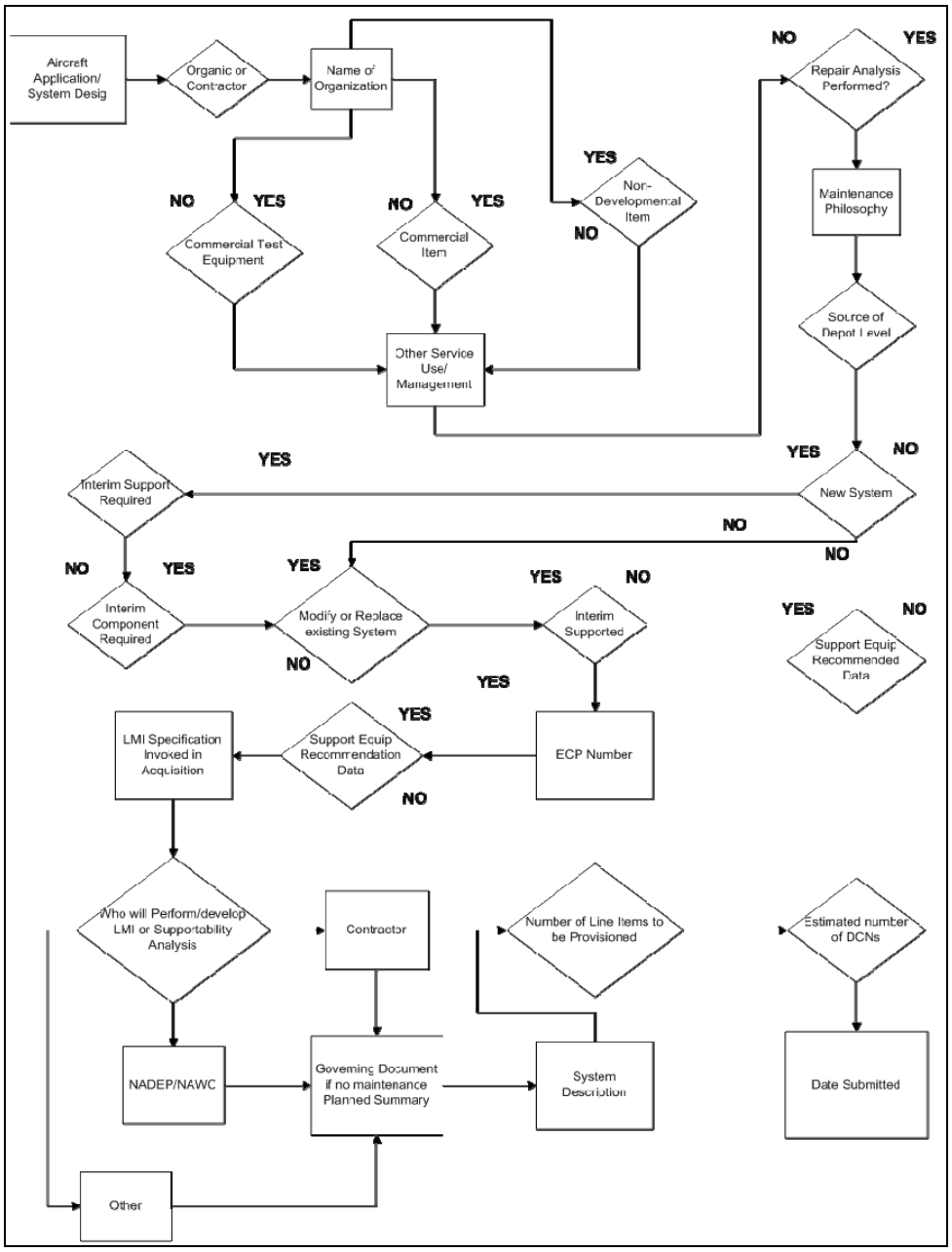

Figure 7. NAVAIR Provisioning Candidate Checklist Flowchart

3. NAVSEA's Hierarchical Structure

NAVSEA by contrast does not have a specific process that all programs are required to use. Its stated mission is to, "engineer, build, and support the U.S. Navy's fleet of ships and combat systems" (NAVSEA, 2011). NAVSEA accomplishes its mission through a hierarchical structure, described in Appendix A. Individual program

managers are responsible for their program's performances and the product team works for the program manager, incentivized by that structure. Discussions with several logistics personnel at NAVSEA indicated that their mission is to ensure operational readiness to the fleet and during ISS they will buy as many of the parts as allowed by the funds available.

Under this hierarchical structure, the product team is organized with one goal that was summarized in the NAVSEA mission statement. The entire team's goal is incentivized by supporting the ship. Program management's triple constraints, cost, schedule and performance drive the team's actions and behaviors. With regard to ISS purchases the cost constraint, seems to be the weakest of the triple constraints. When a system costs a factor of ten more than the individual parts it is easy to neglect the individual spares given their relative expense compared to the whole system. Further, the logistics personnel at NAVSEA are more concerned about not having a needed part, than about purchasing the correct inventory levels for all parts. Determining the correct allowance list means that logistics personnel must incur risk of not having a part that is needed. There is no incentive in this organization for taking that risk as the logistics personnel answer only to their program manager.

Similar to NAVAIR, NAVSEA gets its initial data from the original equipment manufacturer (OEM) developing a new system to determine what material will be purchased in the ISS period. The OEM recommendations are then subjected to engineering analysis to estimate failure rates. Given the lack of historical data procurement decisions are based on limited information and estimates. Similar to with NAVAIR, individual programs determine what parts to buy. However, NAVSEA does not have standardized business rules. The programs that provided data for this project utilize what is called a Program Support Data (PSD) sheet, a common form, but it is not required of all programs and therefore is not used universally. The PSD sheet is a budgeting tool, which lists pertinent technical data for an item that should be supported as well as a deployment schedule for those systems. It does not specifically look at supportability but it does force the people utilizing the PSD sheet to coordinate with NAVICP Mechanicsburg.

The major finding at NAVSEA was that everything is program centric. The instructions do not provide specific detail on how ISS should be managed, they leave the specific detail to the individual program offices. NAVSEA has been highly successful accomplishing its main mission, utilizing this program centric system. However, in recent years, NAVSEA has been criticized for the volume of excess material resulting from procurements.

D. CONCLUSION

Both NAVSEA and NAVAIR have systems in place to determine what material will be purchased in the ISS period. NAVSEA's system is decentralized, and largely left to the individual program managers. NAVSEA's logistics personnel are incentivized to support their program regardless of cost. NAVAIR has a standardized process and has partnered with NAVICP-P to outsource the ISS portion of their systems acquisition. This incorporates conflicting goals to ensure the trinity of cost, schedule, and performance are balanced. Both organizations struggle with procuring material that has no historical data upon which to build their allowance. Chapter V delves into this projects findings.

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V. FINDINGS AND CONCLUSIONS

A. FINDINGS

1. Introduction

In a 1998 Technical Report, entitled "DoD Inventory Management Cultural Changes and Training in Commercial Practices," Naval Postgraduate School Professor Dr. Keebom Kang found thirteen causes of DoD excess inventory (Kang, 1998, pp. 12–13):

1. Incentives for Item Managers, Supply Personnel and Users
2. Unpredictable Demand and High Stockout Cost
3. Lack of Asset Visibility
4. Government Contracting Regulations
5. Monopsony and Lack of Competition
6. Inexperienced Personnel and High Personnel Turnover and Multiple Inventory Managers
7. National Stockpile Requirements and Economic Considerations
8. Geographically Dispersed Commitments and Separate Service Transportation Networks
9. Decrease in Requirements and Base Realignment and Closure (BRAC)
10. Lack of Customer Confidence and Receiving the Wrong Consumable Part
11. Support of Allies
12. Poor Estimates During Initial Procurement Planning
13. Demilitarization Costs

Of these thirteen causes, six are directly relevant to this project. NAVSEA's inventory could better be managed by taking action on: (1) realigning the incentives for Item Managers, (3) eliminating the lack of visibility, and (12) improving the poor estimates

during initial procurement planning. NAVSEA should also have very valid concerns about: (2) unpredictable demand and high stockout cost, (5) monopsony purchases and lack of competition, and (10) lack of customer confidence through receiving the wrong consumable part. The other seven causes are important considerations, but not as relevant to this project.

2. Incentivizing Item Managers

DoD contains many hierarchal organizations that focus on mission readiness at all costs. It is very common for a ship's Commanding Officer to direct the ship's Supply Officer to ensure that certain systems are never in need of parts. This incentive will drive the Supply Officer or his Logistics Specialists to order excess quantities of parts for that system. They are incentivized not to disappoint their Commanding Officer. In the short term, the practice of hoarding parts can help an individual ship stay operational, but in the long term it has a negative effect on the supply system as a whole by showing demand where none exists, and creating shortages by multiple units stockpiling parts. Further, when a unit hoards parts it creates a lack of trust in other units who will also start hoarding parts. Dr. Kang's 1998 study provided a very good example of this from the Army's deployment to Saudi Arabia in 1992. There, Army units ordered items greatly in excess of their needs. Their excess ordering resulted in shortages of material for follow-on units. In the end, "40,000 Sealand containers were sent to the Arabian Gulf during Desert Shield/Storm. About 22,000 of these were never opened" (1998, p. 17). Everyone involved was acting on behalf of their own incentives: no unit in combat wants to be without. Unfortunately, misaligned incentives cause people with good intentions to take actions detrimental to the organization, and the supply system as a whole.

NAVSEA's hierarchical system has similar misaligned incentives such that the logistics personnel benefit from buying in excess, because there are severe consequence for not having a part when needed The logistics personnel for a particular weapon system work directly for the Program Manager. Their evaluations are completed by the Program Manager and therefore there is a high level of professional risk involved in not

ordering a part that may never be needed. Fear of stock-outs resulting in a deployed ship's not accomplishing a mission results in buying excess material. Kang's 1998 study stated:

> Focusing on material availability at any cost without regard for high inventory levels leads to ambiguous objectives (local versus global effectiveness). DoD must review all the factors including organization structure, evaluation and incentive/reward systems, and take drastic initiatives that will lead to system improvement. (Kang, 1998, p. 29)

The problem of availability at any cost still exists and needs to be addressed.

NAVAIR has a structure that incentivizes Item Managers differently; they are not NAVAIR employees, they are NAVICP-P employees and they are physically located in Philadelphia at NAVICP-P, not at NAVAIR Headquarters in Patuxent River, Maryland. At NAVAIR, they do not answer solely to the program office but, the program office is a very vital and important part of their job. LEMs are the Item Managers for ISS, their projects are funded by the NAVAIR program to which they are assigned. Their customer is NAVAIR, but they do not have the same stress for mission accomplishment that NAVSEA places on its logistics personnel. NAVAIR retains the right to keep certain systems under NAVAIR and not have LEMs make the buys or manage the parts; however, this is the exception, not the rule. This allows NAVAIR logistics personnel to focus on major systems acquisition and logistics while outsourcing the management of parts.

3. Lack of Visibility

NAVSEA data have several exceptions that lead to the lack of visible consumption. Specifically, the data sets did not capture demand for direct contractor delivery to ships or warranty repairs made by a contractor after installation. The absence of standardized processes led program managers to develop their own data tracking systems that cannot be shared by the users and other shareholders. In some cases, the first time a ship's Supply Department finds out about a new system is when the maintainers have used all of the contractor-provided spares. Also, the data sets did not

capture issues made by depots for repairs. The lack of demand data makes modeling difficult and inaccurate even after sufficient demand data should have been captured.

NAVAIR PEOs and PMAs utilize Integrated Program Teams (IPT) to plan, and manage, system life cycles. IPTs are product-focused and responsible for meeting the cost, schedule, and performance guidelines of their program. In addition, the constant interaction between the two fosters a joint alignment with added visibility of material support of the entire ISS period. LEMs, while not on the IPT, liaison with the program office on a regular basis to ensure that they are supporting the IPT in an effective manner. Kang's study stated:

> Better coordination between the weapons systems program managers and inventory managers might avoid the generation of some excess inventories. For example, it is important that program managers keep item managers informed immediately of design changes that might affect current procurement. Also, as program offices usually know the very latest information concerning when and the rate at which a weapons system will be phased out, getting this information to item managers quickly might reduce or avert procurement actions. If program offices know of reliability improvements that should reduce demand, inventory managers should be informed. By working together, these two groups can eliminate the deleterious impact their actions sometimes have upon each other. (Kang, 1998, p. 30)

The major advantage of NAVICP-P's LEM system is that it facilitates mutual coordination. While not on the IPT, the LEMs feel that they are part of the team and coordinate with the program offices to ensure they are providing appropriate support. This also enhances readiness at the Material Support Date when NAVICP Item Managers take over management of those parts because they have reliable demand data.

4. Poor Estimates During Initial Procurement Planning

There is no substitute for historical failure rates in a real environment, so estimates for initial planning will continue to create problems for the Program Management Offices and whomever is managing their ISS. NAVAIR and NAVICP both have incentives that encourage buying everything an OEM recommends and in as large of quantities as possible. However, more investment should be made into determining

what will be needed as there exist more scientific forecasting methods that balance service level with inventory levels. Further, NAVSEA had numerous systems that used the same parts. By consolidating management of those parts, more demand data will be captured and safety stock levels can be lowered through pooling effects.

5. Unpredictable Demand and High Stockout Cost

When new weapons systems are introduced accurately determining the amount of spares necessary to support the system is a difficult task that relies on theoretical data or historical data based on similar systems, there is no historical data for that specific system. Many factors that drive forecasts are based on a mathematical approach, such as mean time between failures, historical trends, wartime mission requirements and operational profiles. The factors add difficulty in estimating the correct amount of spares to support a system. This ultimately leads to what is considered a "best guess" to support the system. In addition to the forecasting, operational factors that affect NAVSEA assets are worth mentioning. Deployment schedules for ships have increased, which has led to more wear and tear on the systems. Also, environmental factors such as salt water could degrade the system greatly. Thus, predicting the assets' mean time between failures varies greatly with individual systems. This could cause Item Managers to order excess parts for the system to avoid high stock out costs and prevent ships from not being able to meet their mission requirements. Dr. Kang's 1998 study stated:

> Current DoD performance measures tend to promote high levels of inventory and reflect the traditional emphasis on maximum organizational effectiveness. DoD's prime objective has always been to maintain combat readiness. Operating forces often do not have confidence in the ability of the supply system to support them, so they hoard items, and deliberately order more than they need. The evaluation and incentive/reward systems designed under the concept of *readiness at any cost* discourage commanding officers and inventory managers to be efficient by keeping low inventory levels. They simply do not have strong motivation to reduce inventory level, at the risk of stockout. (Kang, 1998, p. 27)

The high stockout cost associated with naval assets is a major consideration that NAVSEA justly takes into account when supporting a new system. Upgrades to systems vital to the United States National Defense cannot afford failures due to not having parts

support. When considering what parts to buy, it is vital that the system criticality be taken into account. Any changes to NAVSEA's current business practices must address system criticality.

6. Monopsony and Lack of Competition

Monopsony is defined as having one customer. In regard to DoD, it makes sense that the military is the only customer for many weapon systems purchased by both NAVSEA and NAVAIR. With such highly specialized weapons systems program, managers could be forced to procure more of an asset than necessary to keep a production line open, or as safety stock to account for the procurement lead time necessary to replenish used parts and avoid stock outs. Dr. Kang's 1998 paper stated:

> It only makes sense for the manufacturer to want to produce a large lot size and then use its production resources on other items. This increases DoD's inventory, since it must buy and hold more inventory than it could if the item were commercially available. (Kang, 1998, p. 10)

In the data analyzed, many of these specialized weapon systems have common parts or components that make up the system. For example, NAVSEA's data showed that 2,593 of the 9,944 NIINs examined appeared in multiple RICs. If NAVSEA leverages its buys, monopsony becomes less of an issue with those items. Consolidation of the NIINs with multiple occurrences under the control of one Item Manager would increase overall visibility of the NIIN, reduce the number of contract actions acquire that item and ultimately lead to a lower overall safety stock required for those NIINs.

7. Lack of Customer Confidence and Receiving the Wrong Part

Discussion with NAVSEA Logistics personnel show a lack of confidence in NAVICP's ability to support ships due to NAVICP-M's process for procuring new systems. While changing NAVAIR's ISS process in the 1990s, it faced many of the same issues. NAVAIR and NAVICP-P worked together to ensure that the business rules for ISS were different than for post MSD parts. Further, as a safety net NAVAIR retains the right to purchase items without going through NAVICP. This occurs as an exception not as the rule because NAVAIR contracting personnel are better utilized when focusing

on major systems acquisitions, not purchasing spare parts. Additionally, NAVAIR centralized its warehousing of ISS in two contractor run facilities that physically manage the ISS material. All ISS parts are sent to fleet units from these sites allowing for added visibility and control. NAVSEA should adopt NAVAIR and NAVICP-P's system to manage ISS material from IOC to MSD. This would allow logisticians throughout the Navy organization to accurately track their inventory and maintain custody.

As mentioned earlier, NAVAIR PEOs and PMAs utilize Integrated Program Teams (IPT) and other team structures to plan, manage, and carry out acquisition and the life cycle program. IPTs are product-focused and responsible for meeting the cost, schedule, and performance guidelines of their program. In addition, the constant interaction between the two fosters a joint alignment with added visibility of material support of the entire ISS period. NAVICP-P employees Logistics Element Managers (LEM) to work with the IPT and ensure that the IPT's needs are met. According to Dr. Kang,

> The consequences of a decrease in requirements for an item might be partially averted by training the weapons system program office and inventory control point to understand each other's priorities and capabilities. (Kang, 1998, p. 26)

If NAVICP-M utilizes an LEM approach to ISS it should help allay NAVSEA's lack of confidence because the Program Management Offices will interface with their specific LEMs on a daily basis. This will further aid both organizations because NAVICP-M will be fully involved in the ISS process from the inception of a new system through the Material Support Date when NAVICP assumes full responsibility for supporting these systems. This will ensure that NAVICP-M records demand data for the ISS period to adequately support fleet needs. The assignment of LEMs to specific programs will provide NAVSEA Program Management Offices a single point of contact whose sole purpose is the help them support new systems.

B. RECOMMENDATIONS

After careful analysis of the data, it is evident that both organizations have room for improvement in their ISS management. Specifically, NAVAIR can improve the ISS

management database to reflect asset location and demand history. The website interface is user friendly; however, additional improvement can be applied. The ability to locate the physical location of an asset can aid inventory planners with estimating transportation costs and timeframes. For instance, if an asset is required in Norfolk, VA, and there are assets in both ISS warehouses, Beaufort, SC and North Island, CA, it would be more cost effective and save shipping time to have it come out of South Carolina.

NAVSEA should transition to a centralized ISS program. This would allow PEOs and logistics personnel enhanced visibility of their ISS assets. The realignment of inventory personnel serving in inventory management duties moves toward a greater production of efforts and free the program office personnel to focus on major systems acquisition. When people are focused on what they do best, they are more productive and efficient in their duties.

Our research benefited from NAVAIR's ISS website, which allowed us to quickly and effectively pull the data necessary for analysis. Further, while NAVAIR still puts the onus of ISS on the Program Office, NAVAIR works well with NAVICP-P to ensure full spectrum support. This is most evident while speaking with the LEM's at NAVICP-P who feel like as much a part of the NAVAIR team as anyone we spoke with at NAVAIR.

NAVSEA does not have the same relationship with their NAVICP-M counterparts. Both organizations would benefit from some cross-cultural awareness of how and why the other organization does things the way they do. They would also find value in developing cross functional teams that work together to determine what material should be purchased during the ISS period. NAVSEA, given its mission, "to keep ships at sea," understandably wants to ensure that a ship never fails due to a lack of parts. NAVSUP with a focus on "cost wise readiness" attempts to optimize customer needs based on financial constraints. From the 50,000-foot perspective of this project these organizations are not aligned in their goals. While the differing goals cause frustration at the working levels they ensure that neither organization overtakes the other in its goals.

NAVSEA would benefit from having NAVICP-M manage its ISS and allowing NAVSEA to focus on its core competencies. This could be best accomplished by a spirit

of partnership that must be developed. The LEM system at NAVICP-P has been very effective at developing a team mentality and a similar system could provide the same benefits for NAVSEA and NAVICP-M. To accomplish this NAVSEA should:

1. Retain the right by exception to make ISS buys if the LEM cannot meet their needs.
2. Provide funding for ISS through its program offices to ensure it that ISS purchased is what the program needs.
3. Fund and provide oversight for consolidated ISS warehouses. This will force coordination between NAVICP-M and NAVSEA as well as providing NAVSEA more comfort with the process

In developing an LEM system NAVICP-M should:

1. Assign LEMs to specific programs to provide:
    a. a single point of contact
    b. updates to the Coordinated Shipboard Allowance List
    c. familiarity with unique program requirements
    d. further study is necessary to determine the exact amount of LEMs necessary
2. Ensure LEMs have a minimum of 10 years' experience as Item Managers
3. Ensure people hired as LEMs have the personality to balance program office desires with NAVICP-M objectives of cost-wise readiness
4. Consolidate management of common NIINs to a single LEM
5. Assign NSNs at the earliest possible moment

The quick and early assignment of NICNs and I-NICN to legitimate NIINs in both organizations is imperative to have an effective ISS management system. When temporary stock numbers are used in the supply system, inefficient redundancies of time and effort are spent tracking and managing parts. Total visibility is gained when a

temporary stock number is transitioned to NIIN. The establishment of the NIIN allows for legitimate demand and issue tracking. With historical demand captured, inventory managers and provisioning personnel can make educated and informed future decisions on sparing levels. This is perhaps the most important recommendation regardless of who manages ISS.

C. IMPACT

If an LEM system is implemented then everyone involved will see those advantages. NAVSEA will be allowed to focus on its core competencies without using its vital resources for ISS management. This will also improve the visibility of ISS material and allow for more efficient use of the material. NAVICP-M will be better able to incorporate ISS items into the COSAL which will improve system support at the Material Support Date. Inventory management is a core competency of NAVICP-M and its expertise will benefit both NAVSEA and the fleet. Finally, to quote the late Captain Hillary King, "its all about the enlisted sailors!" This system will help the end users by providing added visibility on parts. Fewer man hours will be needed ordering parts because the system will be centralized. The COSAL will provide ISS support, allowing the idiosyncrasies of ISS to be worked out at the systems command and NAVICP-M level. ISS should be seamless to the end user.

D. LIMITATIONS

Given that the data sets did not contain demand data, and that the data collected from the two organizations were not directly comparable, it was difficult to generate substantial data analysis. Due to the large number of invalid NIINs and minimal amount of demand information, the results varied. It was difficult to compare both organizations on similar grounds based on the data analyzed. However, an attempt was made to evaluate the total number of NIIN issues to NIIN purchases. As a percentage of the NIINs procured during the ISS period, the total issues from each organization was divided by the total amount of items procured. The ratio, or percentage, allowed a near equal comparison.

Additionally, the type of weapon system managed by the NAVSEA are typically individual assets with limited commonality of parts. Consequently, the proportion of common ISS among different programs is lower than what you would find at NAVAIR. Spare parts at NAVSEA are usually of low demand, and spare parts at NAVAIR are usually high demand. Consequently, the opportunities for inventory pooling and safety stock reduction at NAVSEA are not the same. Although process standardization at NAVSEA is expected to bring better inventory management and lower excess stocks, it should not be expected that it will provide the same performance as what is obtained at NAVAIR.

E. FURTHER RESEARCH

This research is an initial look into transitioning ISS from NAVSEA management to NAVICP-M management. Further research is needed to fully implement any changes. A manpower study must be conducted to determine the appropriate number of LEMs NAVICP would have to hire to support the new workload. NAVICP-P employees 35 LEMs to support four NAVAIR Program Executive Offices but this may not transfer directly to NAVSEA's five Program Executive Offices. As mentioned previously, NAVSEA has a lack of confidence in NAVICP-M's ability to manage ISS and provide the requisite service level. Two areas for further research arise from this lack of confidence. First, determine the appropriate service level for new systems, a new galley system is not as vital as a new weapon and should be treated as such with common business rules regarding service level and the new system's criticality. Second, this is a major change and research should be conducted on getting NAVSEA program office buy in and how to build a trusting relationship between the two organizations. Another area for further study is to determine specifically how much inventory NAVSEA currently holds and where it is located. This research should focus on how to consolidate these inventories for central management. Finally, further research is required to determine if the Navy's Enterprise Resource Planning software in its current form will be capable of managing ISS material or if it will require software changes to allow for this management.

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APPENDIX A. STRUCTURE OF THE NAVY

Operational Units in the United States Navy have a dual chain of command. Administratively, they Navy reports to the Chief of Naval Operations (CNO). The CNO is responsible for training and provisioning of the navy. When a unit is operational it works for a Combatant Commander who directs day to day actions of that unit. Readers may be familiar with the Combatant Commander named United States Central Command, and commonly referred to as CENTCOM. CENTCOM is a Unified Combatant Commander with responsibility for the central areas of the world which include both Afghanistan and Iraq. Operational units from all branches of the military in the CENTCOM area of responsibility work for CENTCOM, not their administrative chain of command. A naval unit in CENTCOM works for CENTCOM for its day to day mission, but is still responsible to the CNO for administrative matters such as training and provisioning. More information about CENTCOM can be found at: http://www.centcom.mil/about-u-s-central-command-centcom. More information about the CNO can be found at: http://www.navy.mil. More information about unified commands and general DoD organization can be found at http://www.defense.gov.

The main way the CNO accomplishes the mission of training and provisioning is through the shore establishment. These are not operational commands and exist solely to accomplish the aforementioned missions. Figure 8. shows the organizations and their relationships to one another. This project examined three systems commands, Naval Air Systems Command (NAVAIR), Naval Sea Systems Command (NAVSEA), and Naval Supply Systems Command (NAVSUP). It is important to note that each of these activities are equals answering directly to the CNO, but working together to ensure the CNO's missions are accomplished.

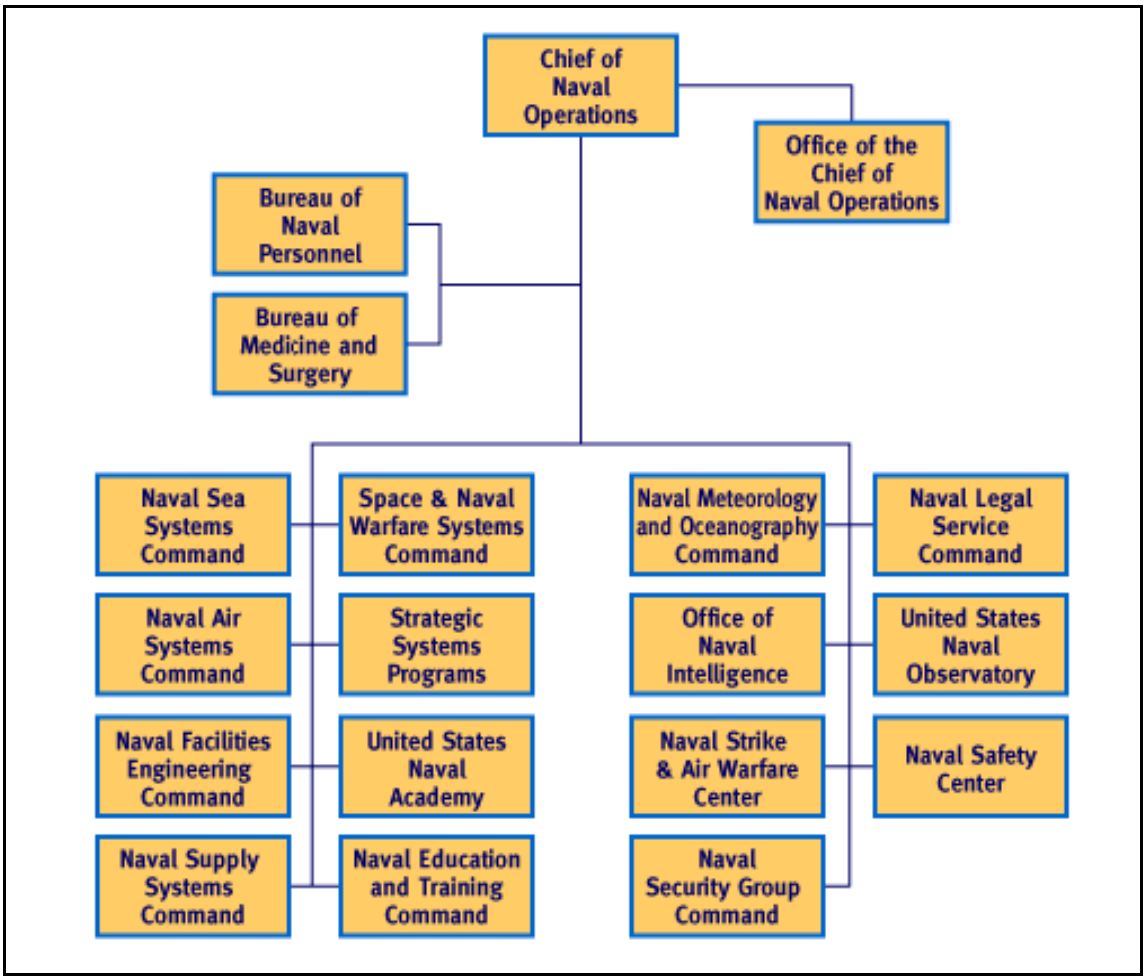

Figure 8. U.S. Navy Shore Organization (From United States Navy, 2006)

APPENDIX B. GLOSSARY

Accountable Activity: The activity that holds official title to the OM&S and whose Line of Accounting was cited in funding the material, unless officially transferred.

Enterprise Resource Planning (ERP): is a generic name of a software-based management system used by forward-leaning corporations around the world to power their crucial "back office" business functions. The Navy ERP Program uses a product from SAP Corporation, which allows the Navy to unify, standardize, and streamline all its business activities into one completely integrated system

Government Furnished Material (GFM): a sub-category of Government Furnished Property, consists of inventory or OM&S furnished to a contractor as Government property. GFM is typically consumed or expended during the performance of a contract. In the case of GFM, the contractor is considered the end-user. When furnished to a contractor, inventory and OM&S are considered GFM.

Government Owned Material (GOM): Now referred to as Operating Material and Supplies (OM&S) is the totality of material assets owned by the Government (i.e., all GFM and any CFM to which the Government will have title upon fulfillment of the contract) and maintained by the SUPSHIP and/or the contractor are collectively referred to as Government-Owned Material (GOM) to include COSAL material, Schedule A, and Installation and Checkout (INCO) material, it may also apply to any new ship construction or conversion program, as well as any ship repair, overhaul, or alteration program.

Initial Operational Capability (IOC): The date applicable to the first attainment of capability to effectively field and support a new weapon system or support equipment at a Fleet operational site.

Interim Navy Item Control Number (I-NICN): A unique control number established for the purpose of identifying and managing new development items during the ISS period and used by Fleet operational sites for MILSTRIP requisitioning and other inventory management requirements.

Interim Supply Support Oversite Center: A NAVAIR funded, contractor operated office which receives and validates MILSTRIP requisitions referred from NAVICP-P and passes them to the appropriate ISS Warehouse Facility for shipment action. The Oversight Center processes daily Transaction Item Reports (TIRs) and forwards them to NAVICP-P to ensure that inventory is accurately reported in the Master Item File (MIF). The Oversight Center's Routing Identifier Codes (RICs) are 'R43' and 'NVC', representing the ISS Warehouse Facilities at NAS North Island and MCAS Beaufort respectively. The ISS Oversight Center also maintains a website which contains all ISS project, asset and issue data, www.navairiss.com.

Interim Support Allowance List (ISAL): A listing of all designated interim support spares and repair parts (similar to an AVCAL or SHORCAL) required to support ISS equipment at an operational site.

Interim Support Items List (ISIL): A NAVICP-P approved and NAVAIR funded listing of spares and repair parts, parts required to support a new or modified weapon system or support equipment during the ISS period.

Interim Supply Support (ISS): Supply and inventory management support for new and modified weapon systems and support equipment provided from Initial Operational Capability (IOC) to Material Support Date (MSD).

Moving Average Cost (MAC): is the Department of Defense (DoD) preferred method for calculating the historical financial unit value of SOM assets (NAVSEA, 2004)..

Material Support Date (MSD): The date when the supply support or all spares and repair parts of new or modified weapon systems and support equipment transitions from ISS to the Government supply system.

National Item Identification Number: A unique nine digit number that identifies each item of supply used by the Department of Defense.

Naval Air Systems Command (NAVAIR): provides full life-cycle support of naval aviation aircraft, weapons and systems operated by Sailors and Marines. This support includes research, design, development, and systems engineering; acquisition; test and evaluation; training facilities and equipment; repair and modification; and in-service engineering and logistics support (Naval Air Systems Command, (2011). retrieved via: http://www.navair.navy.mil/index.cfm?fuseaction=home.display&key=92CEA25."

Naval Sea Systems Command (NAVSEA): develops, delivers and maintains ships and systems on time, on cost for the United States Navy. (NAVSEA, 2010)

Naval Supply Systems Command (NAVSUP): provides Navy, Marine Corps, Joint and Allied Forces with products and services that deliver Combat Capability through

Logistics. NAVSUP manages supply chains that provide material for Navy aircraft, surface ships, submarines and their associated weapons systems. (NAVSUP, 2010)

Operational Availability (Ao): A measure of material readiness, i.e., the expected percentage of time that a weapon system or individual equipment is ready to perform its specified function in its specified operational environment when called upon at a random point in time. It can be expressed as uptime divided by total time less periods of operational inactivity. Sparing based on Ao is also termed Readiness Based Sparing (RBS). When used to develop an allowance computation, the model computes the required secondary items needed to achieve a specified operational goal for the weapon system/equipment. CNO requires that RBS techniques be applied to all new non-nuclear Acquisition Category (ACAT) I through III programs.

Operating Material and Supplies (OM&S): Consists of tangible personal property to be consumed in normal operations including GFM and CAM. Excluded are:

(1) goods acquired for use in constructing real property or in assembling equipment to be used by the entity

(2) stock-pile materials (strategic or critical)

(3) goods held under price stabilization programs,

(4) foreclosed property,

(5) seized, forfeited property, and inventory

(6) GFP, Government Furnished Equipment, Contractor Acquired Property and Contractor Acquired Equipment.

Readiness Based Sparing: This supply support method can be used for achieving Operational Availability (Ao) thresholds specified by CNO. This method is universally applied throughout the weapon system life cycle (including interim support) for new,

non-nuclear, non-SSBN acquisition programs in Acquisition Categories (ACATS) I, II and III. In reviewing individual programs, it must be determined if RBS can be implemented in such a manner so as not to delay the normal provisioning cycle allowing for sufficient administrative and production lead time prior to the Material Support Date (MSD). This methodology uses a given set of reliability a and maintainability characteristics for a weapon system in order to determine the most cost effective range, depth and geographic location of spares and repair parts required to achieve and sustain the Ao threshold.

Reason Code: A one-character field in an AIS that provides rationale for retaining material (NAVSEA Commander, 2004).

Repairable Identification Code: A seven character alpha-numeric code structured in a prescribed format so as to identify specific hardware items from the highest to lowest level. These codes are designed to provide a description of the physical relationships of the various elements within a given hardware application.

Retention Level: Defines a recommended quantity of materials to be held as Sponsor Owned Material (SOM) that was determined through either a policy decision or derived mathematically (NAVSEA Commander, 2004).

Sponsor Owned Material (SOM): programmatic material required to support program managers' mission requirements for production, life cycle maintenance and installation of systems and equipment consistent with their mission charter. The material usage may involve, but is not limited to, such tasks as: item fabrication, assembly, testing, manufacture, development, repair or research and development (NAVSEA, 2004).

Sponsor: A program manager that provides funding for, and authorizes the procurement or the staging of material. Primarily, the Program Manager (PM) will belong to a NAVSEA program office or a program executive office. The term PM is synonymous with Sponsor(NAVSEA, 2004).

Stockpile Materials: Stockpile materials are strategic and critical materials held due to statutory requirements for use in national defense, conservation or national emergencies. They are not held with the intent of selling in the ordinary course of business.

Total Asset Visibility (TAV): defines the capability to provide users with accurate and timely information concerning the location, movement, status and identity of material, including equipment and supplies, as well as personnel and other resources (NAVSEA, 2004).

APPENDIX C. PROVISIONING CANDIDATE CHECKLIST

PROVISIONING CANDIDATE CHECKLIST

FOR SUPPLY SUPPORT MANAGEMENT PLAN (SSMP)

AND PROVISIONING STATEMENT OF WORK (PSOW) DEVELOPMENT

A. APML or Logistics Element Managers Name

Code

Phone

FAX

E-Mail

B. Aircraft Application _____

System Designation _____

Item Name _____

Purchase Req. or Contract Number _____

Type/Name of LSAR Database Used _____

C. Type of Acquisition: (Check One)

Organic _____

Contractor _____

- Prime _____
- Original Equipment Manufacturer (OEM) _____

D. Contractor or Organic Manufacturing Activity (Name) _____

(Address)_____

E. Non-developmental Item YES ___ NO ___

Commercial Item YES ___ NO ___

Commercial Test Equipment YES ___ NO ___

F. Other Service Use/Management:

Army _____ Coast Guard _____

Air Force _____ Other (Specify) _____

NAVICP-Mech _____ N/A _____

Marine Corps, Albany, GA _____

G. Will a Repair Analysis be performed? YES ___ NO ___

H. Maintenance Philosophy? (Check one)

O to D _____

O, I and D _____

I and D _____

Depot Only _____

O Only _____

O to I _____

O and I _____

I Only _____

I. Source of Depot Level Repair? (Check One)

NADEP _____

Inter-service (Specify)_____

Commercial _____

J. Is this a New System?

YES _____

NO _____

If Yes: Is Interim Support Required? _____

Is Interim Component Repair Required? _____

Who will Administer? Activity _____

Code _____

POC _____

Phone # _____

K. Does system modify or replace existing system? _____

If Yes: Identify existing system _____

Is Interim Support Required? _____

Is Interim Component Repair Required? _____

Who will Administer? Activity _____

Code _____

POC _____

Phone # _____

L. ECP Number for K above _____

Approval Date _____

M. Support Equipment Recommendation Data? YES ____ NO ____ N/A ____

Submitted (Date) _____ Revised (Date) _____

Approved (Date) _____ Revision Approved (Date) _____

SERD Item No. _____ Revised SERD Item No. _____

SMR Code _____

N. LMI Specification Invoked in Acquisition: (Check one)

MIL-PRF-49506 _____

Other Standard or Specification (Specify) _____

N/A _____

O. Who will perform/develop LMI or Supportability Analysis?

NAWC/NADEP _____

CONTRACTOR _____

OTHER _____

N/A _____

P. If no Maintenance Planning Summary, what is governing document?

_____

_____

_____

_____

Provided by: Activity _____

Code _____

POC _____

Phone _____

Q. System Description:

CAGE Code _____

Reference Number _____

Quantity Planned _____

Function (Narrative)

_____

_____

_____

_____

_____

_____

R. Estimated Number of Line Items to be Provisioned: _____

S. Estimated Number of DCN's _____ (For L. above.)

T. Fill in completion dates where applicable and available:

	SCHEDULED	ACTUAL
ECP Approval	_____	_____
CCB Approval	_____	_____
Contract Award Date	_____	_____
Design Freeze (PCA)	_____	_____
First Article Test Approval	_____	_____
LMI or Supportability		
Analysis Approval	_____	_____
Maintenance Planning		
Summary Approval	_____	_____
IOC (Fleet Delivery)	_____	_____
Recommended Material Support		
Date	_____	_____
Recommended Navy Support Date	_____	_____

U. Remarks:

_____

_____

_____

_____

_____

V. Signature: _____

W. Date Submitted: _____

X. For completion by NAVICP Code 03621:

Provisioning Coordinator: Name _____

Code _____

Phone _____

Weapons Manager: Name _____

Code _____

Phone _____

PCCN # _____

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